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METHOD OF MANUFACTURING ISINGLASS.

THE following account of the manufactory of Isinglass is the only one ever published. It is the result of a journey to Russia, expressly undertaken to discover the process, and of numerous experiments upon British fish, by the late Humphrey Jackson, of London, and published by him in the Trans. Royal Soc. vol. 63.

THE secret of Isinglass rested a long time solely with the Russians, and made from the fish *Huso*,* or Isinglass Sturgeon; and its name in Greek signifies fish-glue, viz. *ICHTHYO-COLLA*. All authors who have hitherto delivered processes for making fish-glue, or Isinglass, have greatly mistaken both its constituent matter and preparation. To prove this assertion, it may not be improper to recite what a writer of the name of Pomet says on the subject, as he appears to be the principal author, whom the rest have copied. After describing the fish, he says, as to the manner of making the Isinglass, the sinewy parts of the fish are boiled in water till all of them be dissolved that will dissolve, then the gluey liquor is strained and set to cool. Being cold, the fat is carefully taken off, and the liquor itself is boiled to a juicy consistency, then cut to pieces and made into a twist, bent in form of a crescent, as commonly sold, then hung upon a string and carefully dried. From this account it might rationally be concluded that every species of fish, which contained gelatinous principles, would yield Isinglass; and this parity of

* *Accipenser Huso* Lin.

EDIT.

reasoning seems to have given rise to the hasty conclusion of those who strenuously search for the extraction of Isinglass from sturgeon, but as that fish is easily procurable, the negligence of ascertaining the fact, by experiment, seems inexcusable. In my first attempt to discover the constituent parts and manufacture of Isinglass, relying too much upon the authority of some chemical authors, whose veracity I had experienced in many instances, I found myself constantly disappointed. Glue, not Isinglass, was the result of every process.

No artificial heat is necessary to the production of Isinglass, neither is the matter dissolved for this purpose, for as the continuity of its fibres would be destroyed by solution, the mass would become brittle in drying, and snap short asunder, which is always the case with glue, but never with Isinglass; the latter indeed may be resolved into glue with boiling water; but its fibrous recombination would be found impracticable afterwards, and a fibrous texture is one of the most distinguishing characteristics of genuine Isinglass. A due consideration, that an imperfect solution of Isinglass, called *finings* by the brewers, possessed a peculiar property of clarifying malt liquors, induced me to attempt its analysis in cold subacid menstruums. One ounce and a half of good Isinglass, steeped a few day in a gallon of stale beer, was converted into good finings of a remarkably thick consistence. The same quantity of glue, under similar treatment, yielded only a mucilaginous liquor, resembling diluted gum-water, which instead of clarifying beer, increased both its tenacity and turbidness, and communicated other properties in no respect corresponding with those of genuine finings. On mixing three spoonfulls of the solution of Isinglass with one gallon of malt liquor in a tall cylindrical glass, a vast number of curdly masses became presently formed by the reciprocal attraction of the particles of Isinglass and the feculencies of the beer, which increasing in magnitude and specific gravity, arranged themselves accordingly, and fell in a combined state to the bottom through the well known laws of gravitation; for, in this case there is no elective attraction, as some have imagined, which bears the least affinity with what frequently occurs in chemical decompositions.

If what is commercially termed *long* and *short stapled Isinglass* be steeped a few hours in fair cold water, the entwisted

membranes will expand and reassume their original beautiful hue,* and by a dexterous address may be perfectly unfolded. By this simple operation we find that Isinglass is nothing more than certain membranous parts of fishes, divested of their native mucosity, rolled and twisted into the forms above mentioned, and dried in the open air.

The sounds or air-bladders of fresh-water fish in general are preferred for this purpose, as being the most transparent, flexible, delicate substances. These constitute the finest sorts of Isinglass; those called *book* and *ordinary staple* are made of the intestines, and probably of the peritonæum of the fish. The beluga yields the greatest quantity, as being the largest and most plentiful fish in the Muscovy rivers; but the sounds of all fresh-water fish yield more or less fine Isinglass, particularly the smaller sorts, found in prodigious quantities in the Caspian sea, and several hundred miles beyond Astracan, in the Wolga, Yaik, Don, and even as far as Siberia, where it is called *kla* by the natives, which signifies a glutinous matter; it is the basis of the Russian glue, which is preferred to all other kinds for its strength. The sounds, which yield the finer Isinglass, consist of parallel fibres, and are easily rent longitudinally, but the ordinary sorts are found composed of double membranes, whose fibres cross each other obliquely, resembling the coats of a bladder; hence the former are more readily pervaded and divided with subacid liquors, but the latter through a peculiar kind of interwoven texture, are with great difficulty torn asunder, and long resist the power of the same menstruum; yet when duly resolved are found to act with equal energy in clarifying liquors.

Isinglass receives its different shapes in the following manner:

The parts of which it is composed, particularly the sounds, are taken from the fish while sweet and fresh, slit open, washed from their slimy *sordes*, divested of every thin membrane which envelops the sound, and then exposed to stiffen a little in the air: in this state they are formed into rolls, about the thickness of a finger, and in length according to the intended size of the staple, a thin

* If the transparent Isinglass be held in certain positions to the light, it frequently exhibits beautiful prismatic colours.

membrane is generally selected for the centre of the roll, round which the rest are folded alternately, and about half an inch of each extremity of the roll is turned inwards. The due dimensions being thus obtained, the two ends of what is called *short staple*, are pinned together with a small wooden peg, the middle of the roll is then pressed a little downwards, which gives it the resemblance of a heart shape, and thus it is laid on boards or hung up in the air to dry. The sounds which compose the *long staple* are longer than the former; but the operator lengthens this sort at pleasure by interfolding the ends of one or more pieces of the sound with each other; the extremities are fastened with a peg like the former, but the middle part of the roll is bent more considerably downwards, and in order to preserve the shape of the three obtuse angles thus formed, a piece of round stick, about a quarter of an inch diameter, is fastened in each angle with small wooden pegs, in the same manner as the ends. In this state it is permitted to dry long enough to retain its form, when the pegs and sticks are taken out, and the drying completed; lastly, the pieces of Isinglass are collected in rows, by running packthread through the pegholes for the convenience of package.

The membranes of the book sort being thick and refractory, will not admit a similar formation with the preceding, the pieces, therefore, after their sides are folded inwardly, are bent in the centre in such a manner that the opposite sides resemble the cover of a book, from whence its name; a peg being run across the middle, fastens the sides together, and thus it is dried like the former. This sort is interleaved, and the pegs run across the ends, the better to prevent its unfolding. That called *Cake Isinglass* is formed of the bits and fragments of the staple sorts, put into a flat metalline pan, with a very little water, and heated just enough to make the parts cohere like a pancake when it is dried; but frequently it is over-heated, and such pieces, as before observed, are useless in the business of fining.

Isinglass is best made in the summer, as frost gives it a disagreeable colour, deprives it of weight, and impairs its gelatinous principles; its fashionable forms are unnecessary, and frequently injurious to its native qualities. It is common to find oily putrid matter and *exuvie* of insects between the implicated membranes,

which through the inattention of the cellar-man often contaminate wines and malt-liquors in the act of clarification. These peculiar shapes might probably be introduced originally with a view to conceal and disguise the real substance of Isinglass, and preserve the monopoly; but as the mask is now taken off, it cannot be doubted to answer every purpose more effectually in its native state, without any subsequent manufacture whatever, especially to the principal consumers. Until this laudable end can be fully accomplished, and as a species of Isinglass more easily procurable from the marine fisheries may probably be more immediately encouraged, it may be manufactured as follows :

The sounds of cod and ling bear great analogy with those of the *accipenser* genus of Linnæus—and are so generally well known as to require no particular description.

The Newfoundland and Iceland fishers split open the fish as soon as taken, and throw the back bones with the sounds annexed in a heap. But previous to incipient putrefaction, the sounds are cut out, washed from their slimes and salted for use. In cutting out the sounds the intercostal parts are left behind, which are much the best; the Iceland fishermen are so sensible of this, that they beat the bone upon a block with a thick stick, till the pockets, as they term them, come out easily, and thus preserve the sound entire. If the sounds have been cured with salt, that must be dissolved by steeping them in water before they are prepared for Isinglass; the fresh sound must then be laid upon a block of wood whose surface is a little elliptical, to the end of which a small hair brush is nailed, and with a saw-knife the membranes on each side of the sound must be scraped off. The knife is rubbed upon the brush occasionally to clear its teeth; the pockets are cut open with scissars and perfectly cleansed of the mucous matter with a coarse cloth; the sounds are afterwards washed a few minutes in lime-water, in order to absorb their oily principle, and lastly in clear water. They are then laid upon nets to dry in the air, but if intended to resemble the foreign Isinglass, the sounds of cod will only admit that called *book*; but those of ling of both shapes. The thicker the sounds are, the better the Isinglass, colour excepted; but that is immaterial to the brewer, who is its chief consumer. This Isinglass resolves into fining, like the other sorts in subacid

liquors, as stale beer, cyder, old hock, &c. and in equal quantities produces similar effects upon turbid liquors, except that it falls speedier and closer to the bottom of the vessel, as may be demonstrated in tall cylindrical glasses; but foreign Isinglass retains the consistency of fining preferably in warm weather, owing to the greater tenacity of native mucilage. Vegetable acids are, in every respect, best adapted to fining; the mineral acids are too corrosive, and even insalubrious in common beverage.

It is remarkable, that during the conversion of Isinglass into fining, the acidity of the menstruum seems greatly diminished, at least to taste; not on account of any alkaline property in the Isinglass probably, but by its enveloping the acid particles. It is likewise reduceable into jelly with alkaline liquors, which indeed are solvents of all animal matters; even cold lime water dissolves it into a pulpous *magma*. Notwithstanding this is inadmissible as fining, on account of the menstruum, it produces admirable effects in other respects: for, on commixture with compositions of plaster, lime, &c. for ornamenting walls exposed to the vicissitudes of weather, it adds firmness and permanency to the cement; and if common brick mortar be worked up with this jelly, it soon becomes almost as hard as the brick itself; but for this purpose it is more commodiously prepared by dissolving it in cold water, acidulated with vitriolic acid; in which case, the acid quits the jelly, and forms with the lime a *selenitic* mass, while at the same time the jelly being deprived in some measure of its moisture, through the formation of an indissoluble concrete among its parts, soon dries, and hardens into a firm body, whence its superior strength and durability are easily comprehended.

It has been long a prevalent opinion, that sturgeon, on account of its cartilaginous nature, would yield great quantities of Isinglass; but on examination, no part of this fish, except the inner coat of the sound, promised the least success. This being full of *rugæ*, adheres so firmly to the external membrane, which is useless, that the labour of repeating them supersedes the advantage. The intestines, however, which, in the larger fish, extend several yards in length, being cleansed from their mucus and dried, were found surprisingly strong and elastic, resembling cords made with

the intestines of other animals, commonly called *cat-gut*, and from some trials, promised superior advantages when applied to mechanical operations.

REMARKS.

TOOKE informs us,* that besides the sturgeon and other fish, Isinglass is made from the sounds of shad in Russia, but that it is of an inferior quality. They are pounded, and as the glue does not entirely dissolve, it is strained, and the filaments separated from it. The experiments might be made with the sounds of the large shad, in the rivers of the United States.

The manufactory of Isinglass might become a very profitable branch of business to the people in the vicinity of our great rivers, in which sturgeon and shad abound. For it appears that before the revolutionary war, premiums were offered in England for Isinglass made from the fish of the colonies; in consequence of which several specimens of fine Isinglass were sent to England, with certificates as to the unlimited quantity that might be procured.

The sounds and tongues of codfish are carefully preserved on the Banks of Newfoundland, and put up together in kegs. The value of these is comparatively small with that of the article in question. If therefore the sounds be found to answer the purpose of making Isinglass, the alteration in the mode of preparing them may prove very profitable to the New England fishermen. A first or second experiment may not succeed; but the ingenuity of our countrymen will readily overcome the difficulty attending a new process; and the prospect of ample remuneration for their trouble will doubtless cause the attempt to be made.

During the late embargo in the United States, Isinglass rose to the enormous price of ten dollars per lb. and although it is probable that the same cause will not soon operate again, yet the political events of the continent of Europe may occasion another scarcity. There is every reason, therefore, to think that the manufacture of the article will pay well.

* Survey of the Russian Empire.

Good Isinglass is esteemed the finest and purest specimen of animal gelatin. It is without smell or taste, and entirely dissolves in warm water, forming the clearest and most colourless of all the known jellies.

Uses.—An excellent cement for joining glass may be made by evaporating the jelly of Isinglass to a proper consistence. The coarser sorts of fish glue, dissolved in water, are used as common glue. The finer sorts are much used in confectionary and for clarifying malt liquors, and wines. For these purposes many tons weight are annually exported from Russia to all parts of Europe and the United States. Cider too, is best clarified by Isinglass; the process shall be given hereafter.

CAVIAR.

THE roes of sturgeon might also be profitably applied to the making of *caviar*, which is a favourite food in Russia, and a very important staple article of export.

The best caviar is made from several kinds of sturgeons, the *sevruga*, and *belugas*, &c. The two latter are not found in the United States. Much of the caviar of Russia goes to Italy, and some to England. In some years the amount is from 15,000 to 20,000 poods.* The best sort, or grained caviar, is made in the following manner, according to Tooke. The cleansed roes are salted in long troughs, with eight or ten pounds of salt to the pood, well mixed by shovelling it over and over, then put by portions into sieves or thick nets stretched out, to drain and to coagulate, on which it is immediately pressed into casks. The cleanest and best sort is that which to appearance consists entirely of the eggs of the roes, and does not easily become fœtid. The first thing to be done is to get ready a strong brine, then long narrow bags of strong linen: these are half filled with fresh roes, and filled to the top by pouring in the brine. When the brine has oozed through, the bags hanging on transverse poles, are powerfully wrung with the hands one after another; and the

* A pood is 36 lbs. English. EDIT.

roes, after drying for ten or twelve hours in the bags, are put into small casks.

Caviar is also prepared by taking all the nerves or strings out of the spawn, washing it in wine vinegar, or spreading it on a table; then salting and pressing it in a bag; after which it is put into a vessel perforated at the bottom, to allow the moisture to run out if any should remain. It somewhat resembles in taste the essence of anchovies. For an account of the value of caviar as an article of export, see *Domestic Encyclopedia*.

On the Encouragement given to the MANUFACTORY OF FINE CLOTH, by the Legislature of New-York, in a letter from R. R. Livingston, Esq.

Clermont, August 5, 1809.

SIR.

I have received your favour of the 20th July, and am much gratified to learn that the efforts of your society for the improvement of cattle are likely to be attended with success. This state affords some very fine descendants of Bakewell's stock, and we are beginning to give attention to their extension, particularly in the western part of it, where the pastures are very fine. I think with you, that the cattle of Europe do not degenerate here, except by neglect and not preserving the races pure—both of these evils will be remedied by the emulation which your society will excite. I am much pleased that you have found the samples of wool* worthy the attention of the Cattle Society. I am persuaded that its quality has improved under my care, though the original stock was of the finest that could be procured in Europe. The women, who are now spinning some of it, and who spun the fleeces of my full-bred sheep last year, declare that it is finer and better than it was; it certainly is more abundant. I am not surprised that your Merino wool has not yet found its price. When the supply is small and irregular, the manufactures do not pre-

* Mr. L. had sent to the Editor, two samples of his full-blooded Merino ram's wool, which were exhibited at the Cattle show, in July last.

pare the machinery necessary for its manipulation, and private families, not being in the habit of working it, do not know how to wash or card it. The same process that is used for common wool, runs it into knots and spoils it entirely. The first fleeces I sold was in 1806, for till I returned from France in 1805, the sheep I sent over three years before, were neglected, and did not increase; it then fetched only one dollar for the full-bred, and sixty cents for the rest of the flock, consisting of $\frac{3}{4}$ and $\frac{1}{2}$ bred sheep, and even then I gave a year's credit. There was then no carding mill at which it could be carded. My flock and their descendants have produced two mills with fine cards, and a third is now erecting, and my instructions have enabled private families to wash and card it with cotton cards, and in consequence of this, the wool has reached the prices I have mentioned, and instead of a year's credit to the manufacturers, they pay one half the price down, and the residue in eight months. When as matter of favour, I have spared small quantities to private families, as twenty or thirty pounds, they pay down the price, and some have even advanced the money to my overseer three months before the sheep were shorn, in order to secure a preference.

It may be useful to mention to you one great cause of the anxiety to have fine wool, which is now diffusing throughout this state. Our legislature have, very wisely, given a bounty of eighty dollars for the best specimens of woollen cloth, not less than thirty yards narrow cloth, wove in private families, and a higher bounty for two hundred yards made by professed manufacturers. The candidates in each county exhibit their cloth to the county court at their autumn sessions. The person to whom the prize is adjudged, has an order upon the county treasurer for the amount. The judges transmit a half of a yard of the cloth, with their certificate of the breadth and length of the piece to the society for useful arts, who determine which of the specimens sent them are the first, second and third best of the private claimants, and which the first and second best of those exhibited by professed manufacturers: the first in each line receives from the state treasury a piece of plate of the value of one hundred and sixty dollars, the second of one hundred dollars, and the third of eighty dollars, in addition to the

county bounty. The last year, the first prize for domestic manufactured cloth was adjudged to that made from my $\frac{3}{4}$ bred wool—that of the first quality was manufactured for my own use, and not exhibited for the prize, not having the necessary breadth. The first manufacturer's prize was taken by one to whom I sold my half-bred wool, and all the state prizes have been, I believe, adjudged to cloth made from half-bred Merino fleeces. This has opened the eyes of the public to this object, and excited so great an emulation among the farmers, that many are anxious to procure the wool, and I do not doubt, that at least one hundred pieces of cloth will be offered for the premiums this year.

I have had it very much at heart to render this breed of sheep common, and have accordingly published in the newspapers, in a plain stile, several little essays on the subject, which have had all the effect I promised myself from them in this state, and the western parts of Massachusetts, beyond which they did not reach. Having (as I believe) been the first to introduce the Merino full-bred into the United States, (mine having been sent from France in the spring of 1802, about three or four months before those of col. Humphreys were sent from Spain) I feel a great interest in seeing my fellow citizens avail themselves of the advantages they present, and the rather, as they are a more hardy and thrifty race than our own, as is acknowledged by every person who sees my mixed flock of common and Merino sheep feeding together, either on dry food or on grass. If, therefore, you conceive that any thing I have communicated may contribute to this desirable end, you are perfectly at liberty to use it as you think proper. I am sorry that it is not in my power to furnish the gentleman you mention with a full-bred ewe, as my whole stock of the full-bred ewes at present is only twenty, and I have it in contemplation to extend my flock to about 1000 sheep. At present, including lambs, it does not amount to four hundred of the full and mixed breeds; but I am now in such a train that I shall advance very rapidly. * * * * *

I am, sir, with esteem,

Your most obdt. humb. serv't.

ROBT. R. LIVINGSTON.

James Mease, M. D.

REMARKS.

The foregoing letter is published in the hope that the wise example exhibited by the state of New-York, will be followed by every state in the Union, and especially by our own, the soils and climates of which, as has been amply proved, are admirably calculated for raising sheep, and the improvement of wool. It cannot be denied, that whatever may be the aggregate amount of individual or domestic labour, in that and other articles in our state, (and it is certainly great) Pennsylvania is far behind New-York, Massachusetts or Connecticut, in the spirit for the propagation of Merino sheep, or for manufacturing cloths: not one complete establishment to any extent, existing in the whole state. Hitherto indeed so far from encouragement being given to improvers of wool, there has been a total indifference thereto by our legislature, which although composed of more than three-fourths farmers, declined until lately to do any thing on the subject; even to afford negative aid, by a trifling tax on those worthless animals about a farm—dogs: the whole proceeds of which, even now, in the township, in Delaware county, in which the writer's farm is situated, would not amount to a sum, equal to what he thinks some of his half-blooded Merinos are fairly worth. What remuneration might be expected, if a full blooded ram, or even one of the fourth cross were sacrificed by a cur or hound? It is to be hoped that the hint will be taken, and that every possible encouragement to the increase of our flocks, and to the extension of woollen manufactures will be afforded without delay. A small portion of the wealth of the people, cannot be distributed by their representatives, to greater profit for those from whom it is collected, than by stimulating them by premiums, to attend to an object so important as that under consideration, and by aiding and fostering the endeavours of those who have turned the public attention to this GREAT SOURCE OF AGRICULTURAL RICHES, and PUBLIC PROSPERITY.

ON THE DISTILLATION OF GIN IN HOLLAND.

Some years since, in consequence of the evasions of the duty upon home distilled spirits, which were practised in England, but particularly in Scotland, the British parliament instituted an inquiry into the subject, and several interesting reports by committees of the house of commons, and other publications were in consequence made. The following paper on the subject, by Mr. E. G. J. Crookens, a Dutch distiller, but resident in England, was written at the request of the committee of the house, and details several particulars, from which, it is hoped, the distillers of the United States may derive some useful hints. The author, however, acknowledges, that he has "omitted some *peculiar manipulations*, which have no influence upon the public welfare, and which can merely serve the private purposes of distillers."

IN order to answer the questions relative to the purity and goodness of the spirit distilled from grain, I shall chiefly confine myself to that which is distilled in Holland, and so much esteemed in this country, on account of its flavour as well of its purity and salubrity; because the nature of this spirit or geneva, and the method of distilling it, from the first beginning to the last stage of rectification, is better understood by me than the spirit distilled in this country, and the manner of distilling it. If you consider the humidity of the air in Holland, and the influence which this unhealthy air must naturally possess upon the health of the inhabitants, and that not only all the physicians, but also the people at large, are convinced that the spirit drawn from grain, or geneva, as it is there distilled, if drunk with moderation, is an universal preservative against the infirmities and epidemical diseases, which this damp air must naturally produce, it cannot be a matter of surprise that the use of geneva is so universal throughout Holland, and that the Dutch nation has carried the art of distilling it to a degree of perfection which it has not yet been possible to attain in any other country. To form a judgment on the beneficial nature of this spirit, I shall only quote this one fact, averred by daily example, and which has certainly not escaped the notice of English travellers who have traversed Holland, or resided there some time with a spirit of observation, viz. that numbers of persons are found much advanced in years who since their youth have made considerable debauches in this spirit, while

all those who commit similar excesses in foreign spirits succumb and perish in the bloom of life ; and this observation leads me naturally to this question, Wherein does that beneficial virtue of the Dutch geneva consist, which it enjoys in preference to all other spirits ? The answer to this question must be found in the sort of grain, in the good quality of each sort, in the manner of proceeding and drawing from it a spirit which is pure, and unmixed with any heterogeneous matter which might impair its natural goodness. An explanation of these points will contain, I think, the answer to the principal question respecting the manner of improving and meliorating the distilleries in this country.

I am perfectly aware that, treating on these particulars, I shall not be able to explain myself in a language which is not my native speech, with that purity and precision which the importance of the subject requires ; but I shall endeavour to supply this deficiency by that veracity and frankness which may naturally be expected from a man who is not in the least connected with the distillers in this country, nor any wise personally interested in concealing or altering facts, and who in this business looks out for no other reward but the pleasure and satisfaction of being able to contribute his mite to the public welfare, and to the preservation of the health of so many millions of people, who may suffer either from the ignorance or avarice of the distillers,—reserving to myself only some peculiar manipulations, which have no influence on the public welfare, and which can merely serve the private purpose of distillers, who use and put them in practice.

On entering upon this subject I shall have no occasion to enlarge on the quality of the grain, it being universally known, that in order to produce a spirit which is pure, and of a pleasant flavour, grain must be used which is pure, and not spoiled by wet either in the field or the granaries. I shall therefore confine my observations on the species of grain, and observe in this respect, that the Dutch distillers are perfectly acquainted with the manner of drawing spirits from the malt of barley, as well as from unmalted barley with a portion of malt added to it, in the proportion of a third or fourth part ; and there are several petty distillers in that country who still make use of that grain on account

of its low price; all great distillers in Holland are convinced that malt yields not only a purer spirit, but also a greater quantity than raw barley mixed with malt, contrary to the general opinion of the distillers in this country. The artificial vegetation which the grain undergoes, disengages the saccharine matter, and renders it more proper to be extracted by the water; nay it augments the saccharine matter contained in the grain. To be convinced of the truth of this remark, we have only to examine the malt from time to time during the operation, and we shall find that this matter develops itself more and more as the grain grows longer; yet this vegetation should be stopped as soon as this matter is disengaged from the length of the grain, otherwise the saccharine part will be lost; and if it be stopped too soon, when this matter has only disengaged itself from half the length of the grain, as is done by several brewers in Holland, all the saccharine matter contained in the grain not being disengaged, it cannot be so easily dissolved in the water. I am convinced by several experiments, which I have made myself on several sorts of malt, and in different degrees of perfection, that about a fourth part more spirits is obtained from malt, which is perfectly well made, than from that in which the vegetation has been checked too soon or carried to excess. The manner of drying it is also an article of equal importance; and, in general, malt dried too quick, and by an unequal heat, yields not as much spirit, nor a spirit of as pleasant a taste, as malt dried in an equal and slow manner. If it be considered that the saccharine matter of the grain produces alone and exclusively the spirit, it will be easily conceived that malt of barley must yield more spirit, and of a more pleasant taste, in proportion as the saccharine matter is developed in the malt, and rendered more proper to be extracted and dissolved by water, than in unmalted or raw grain, where this matter is united and combined with the other particles of the grain; and if some distillers in this country are of opinion that raw barley, mixed with a certain quantity of malt, produces somewhat more spirit, they must necessarily have made their experiments with malt which had not attained the last degree of perfection. I rather incline to think that the distillers in this country prefer raw grain for the same

reason it is preferred in Holland, namely, because it neither costs so much trouble nor expense, and that the result depends not on as many little circumstances and precautions.

In Holland barley is but very seldom made use of, notwithstanding the purity of the spirit which it yields, as it has been found out that barley yields but little spirit compared with other grain: for this reason other species of grain have been substituted in its place, which yield a more considerable profit, while at the same time the spirit they give is by no means inferior, from the precautions attended to in the operation.

Wheat mixed with a portion of barley malt, in the above mentioned proportion, yields more spirit than barley, and of a vinosity and fineness of taste which exceed all belief; and the distillers in Holland, who wish to produce a very fine geneva, make use of wheat, and sell this spirit to private persons, who desire to have it, at double the price of common geneva; and if the fermentation and distillation be conducted with prudence, a spirit may be drawn from it which equals the spirit of wine in vinosity and flavour. I have known a distiller in Rotterdam who sold his spirit drawn from wheat for true French spirit of wine; and in order to give it this flavour, he made the grain ferment with the dried lees of wine, which he procured from France, instead of barm; the lees of wine having this advantage, that they procure a slow fermentation, and, as they contain a considerable quantity of essential oil of wine, they communicate to the spirit the flavour of the wine from which they are taken. In Westphalia, and throughout the whole circle of Lower Saxony, no spirit of wine is to be found any ways passable, although the distillers follow the process observed in Holland in regard to the composition, without acting upon the principles of the Dutch distillers with respect to the fermentation and distillation, excepting the bishopric of Hildersheim and its environs, where the distillers make use only of raw wheat mixed with a small portion of malt; and this proves the superiority of wheat above all other species of grain.

Notwithstanding all these advantages, wheat is not made use of in Holland for common or general use, as experience has proved that rye, which in ordinary times is much cheaper than wheat, gives

nearly a third more spirit than wheat, and that by the way of proceeding they have attained the art of drawing from it a vinous and pleasant spirit, and in point of salubrity by no means inferior to that drawn from barley or wheat, nay, perhaps superior in this respect to the two others. Previously to my entering upon a minute account of the distillation made use of and practised in Holland, I ought to observe, that it must not be supposed that all the distillers scattered through that country are able to make good spirits. You find, on the contrary, in many places very bad geneva; it is only the great distillers in Schiedam, Welsep, Rotterdam, and in general the distillers in the province of Gueldres, who are capable of delivering the spirit, which is so much sought after and valued in foreign countries, while petty distillers, though they follow the same method, but not to the same perfection, from want of a knowledge of the first principles, and of a good theory of the art of distillation, fail in their object; and it is for this reason that the servants and workmen who were procured in England from the distilleries in Holland, have never been able to succeed in producing a spirit of the same good quality as their ancient masters made in Holland. In Holland are also found unprincipled distillers, who, making use of spoiled grain, have recourse to the pernicious additions to cover the bad taste and flavour of their spirit; but fortunately the palate of the people is so accustomed to a pure spirit, that this pernicious geneva cannot be sold in the interior, but is for the most part exported to the two Indies, Africa, and other countries.

Commonly three sorts of spirit are made: one which requires to be rectified over juniper berries for the use of the interior, which is in some degree weaker than that exported for England, because in Holland it is not usual to mix it with water, but to drink it pure; another for being exported to England, also rectified over a small quantity of juniper berries, but some degree stronger; and a third sort, rectified to the same degree of strength, but without the addition of juniper berries, for exportation to America, because the North Americans do not like that flavour, but prefer the spirit quite pure, without any addition which may give a peculiar taste.

There are two principal processes:—The major part of the distillers take a quantity of flour of rye, ground rather grossly, mixed with a third or fourth part of barley malt, proportionate to the size of the tub in which the vinous fermentation is to be effected. They begin by mixing it with cold water; this mixture is much stirred with the hand to prevent the flour from gathering into lumps, and that it may be evenly divided. When this point is attained, water is added to the mass, which water must have been heated to the degree of the warmth of human blood: the whole must be well stirred, in order to divide the grain in an even manner; after which the ferment is mixed with this wash, after it has been previously well diluted with a little of the liquid. Great attention should be paid to the tub being kept in a moderate degree of warmth, fit for the intended fermentation, by giving the air some access to the liquid, and by preventing the rays of the sun from falling on the tub in summer, and by procuring a current of fresh air for the laboratory: the fermentation generally begins in this case six hours after; should it be sooner, it is judged that the fermentation will be too strong, and means are employed to check it: if it does not commence soon enough, proper means are made use of to accelerate it: if the fermentation be well conducted, it generally terminates the third day, and the liquor grows very transparent, and assumes an acrid taste, hot and biting on the tongue. When it has attained this point, the wort is well stirred, and the mash, with all the corn, is put into the caldron; and hereupon they proceed to the first distillation, which is conducted very slowly. Great attention should be paid, that the mash be taken exactly at that time, before the acetous fermentation, which destroys the spirit, can begin. The slowness of the first distillation is a point of the utmost importance; because, if you proceed rapidly, the essential oil goes over with the spirit, and mixes with it so intimately, giving it at the same time an unpleasant taste of corn, that it is impossible to separate it from the spirit, or to destroy this taste, but by pernicious additions hurtful to health: thus, then, the success in obtaining a good spirit chiefly depends on the first distillation. Hereupon the liquor is rectified over juniper berries once or twice, according to the

sort of spirit which it is intended to produce. Some distillers mix their juniper berries immediately with their wort, and cause the whole to ferment together; but in this case they can only draw from it a spirit for the use of the interior, or for exportation to England; for this reason they are generally only made use of at the rectification. In the before-mentioned case, and method of operating, I would however recommend the addition thereof previous to the fermentation, because the juniper berries by their aromatic virtues augment the spirit a little if the fermentation be conducted in a proper manner, as will be seen in the sequel.

The second method observed by the best distillers is as follows:—You take the malt and rye in the given proportion, and further some warm water, heated to a certain degree of warmth; you mix the corn grossly ground, with this water, stirring and working it well, until the whole be well mixed and evenly divided; then let the wash rest some time, until the meal has settled at the bottom; hereupon let the liquid matter flow into the fermenting tub, and recommence the same operation with another quantity of water poured upon the same corn, and repeat these operations until you are convinced that the water thus drawn from the corn at different times has dissolved the whole saccharine matter contained in the meal; put this water into the fermenting tub, and as soon as the warmth is diminished somewhat under the temperature of the blood, add the ferment. The fermentation does not begin so soon as in the first method, but is more regular and slow. Other distillers, who observe the same method, pour all the water which they intend to make use of, in order to have a well diluted wort, and of an equal degree of heat, at once in a tub, and put their meal gently and slowly into this whole mass of water, while one or two persons are quickly stirring the mixture with sticks made expressly for that purpose, in order evenly to divide the meal, and to prevent it from gathering into lumps. When the whole is well mixed they proceed, as mentioned in the preceding article, by drawing off the liquid from the grosser matter, &c. &c.

This method is not entirely to be rejected, because the water has thus a more free access to every part of the corn, and for

this reason can more easily extract the saccharine matter. After the fermentation is finished, and the liquid has become very transparent, and assumed the hot and biting taste, you proceed to the aforementioned slow distillation.

In all these cases the water for making the wort must be more heated in winter than in summer; and when the weather is uncommonly hot, you should cool the liquid with cold water, and at the same time add to it a little fresh flour; and by this means you obtain a slow and almost imperceptible vinous fermentation, which is a very important point in regard to the quality as well as the quantity of spirit.

The water which is made use of is also deserving the utmost attention. Hard water, and which is loaded with many particles, produces less spirit, and of a harsh and hard quality. In Holland they make use of the water of the Meuse, and keep vessels expressly for that purpose, which load the water in that river, and convey it to the laboratory of the distillers. In other places they take the water of small brooks, where the water flows over a sandy ground, and they take care to make a provision of it when the weather is still and calm, and not immediately after a heavy fall of rain, by which the water might have been muddy. They who have adopted the first method are of opinion, that by this operation, and by distilling the whole mass at once, they obtain a greater quantity of spirit, and that they have less trouble in making the composition. In this they are, however, grossly mistaken. The great many experiments I have made in Holland with either method, and which two years ago I repeated in the electorate of Hanover, at a distiller's of my acquaintance, have confirmed me in the opinion, that by this method no greater quantity is obtained, and that the spirit, *ceteris paribus*, is less pleasant and of a harsher taste, for this evident reason, that with the greatest precaution it is hardly possible to prevent the thick mass, exposed to the immediate action of the fire, from communicating to the liquor an empyreumatic taste; and it is by no means improbable, that previously to the fermentation, all the essential oil not having been set a liberty, a part of it has remained united and incorporated with the flour, or at least with the husks of the grain, and

only disengages itself by the aid of the heat during the fermentation and distillation ; so that, following this method, you are in danger of causing a large quantity of essential oil to go over with the spirit. This method has also the inconvenience attending it, that you are obliged to leave the caldron open till the liquid begins to boil, and that in the mean time a man must continually stir this mass with a stick to prevent it from sticking to the bottom of the caldron, and being burnt, until the liquor begins to boil up: at this time the greatest danger is over, and the lid is put on. Thus nothing is gained in point of trouble, because, in following the other method, you proceed immediately to the distillation. Among the advantages which the dilution of the mash, together with the slow fermentation and distillation, communicates to the spirit distilled in Holland, both in point of flavour and salubrity, must also be counted, that the best distillers know how to extract from this mash all the ferment, by which means the spirit is rendered more pure ; because the ferment, of whatever nature it may be, contains most of the essential oil of the matter whence it is taken, and that by this method the greatest part of this oil is taken from the liquor before the distillation, while at the same time they derive from it this profit, that they never have occasion to buy their ferment from the brewers, but on the contrary sell, themselves, a considerable quantity of it, after having dried the same in the shape of loaves, in which state they preserve it for years, if it be kept in dry places ; and in this state it is much sought after by bakers as well as by private families, because this dry ferment, which is diluted with a little water, never communicates to the bread or pastry the bitter taste which barm does, loaded as it is with the bitter particles of the hops. The distillers, who are acquainted with this method, enjoy the additional advantage, that they can continue to distil during the summer, and at such times when barm or yeast is extremely scarce. The profit which they obtain from this ferment is one of the reasons of the low price of the Dutch geneva, compared with the price of spirits distilled in other countries ; but as they who are perfectly initiated in this art keep it a secret, I shall not explain at present the manner in which they

proceed, from the motives which I have assigned at the beginning.

And as the Dutch distillers are under no sort of constraint in their operations, nor have the least reason to hurry them, they take the greatest care to clean after each operation their caldron, and above all their tubs, in which the vinous fermentation is effected; and they never fill them again, but after having thoroughly cleared them from the ferment, which sticks to the sides of the tubs, from the last fermentation, because they know from experience, that the least remains of this matter gives the following liquor a bad taste; for this purpose they clean them with lime water, and never with soap, because the caustic alkali contained in the soap would not fail to give the liquor an urinous taste.

As the Dutch distillers are thoroughly convinced that the success of their operations depends on a slow distillation, they take particular care to have their fire-places constructed in such a manner, that the distiller may have it entirely in his power to abate or accelerate the action of the fire at every moment when he shall think it necessary. It is impossible to fix upon a peculiar form to serve in all cases, as it must naturally vary according to the form of the vessel; but they never lose sight of the following general rules: viz. 1st, That the place which contains the fire must be contrived in such a manner, that the action of the fire operates equally on the whole surface of the bottom of the caldron without being concentrated to one point, where the caldron would be burnt, and unavoidably and immediately communicate to the liquor an empyreumatic taste: by this equal action of the fire, the liquor is heated in a more equal manner, and by a moderate fire; and also quicker than if the fire acted only upon one point. 2dly, That the openings of the fire-places be iron doors, in which are made several small holes, which can be opened and shut, as occasion may be, to accelerate or check the current of air. 3dly, That the chimney be furnished with an iron plate, or damper, placed horizontally, by which the diameter of the chimney can be diminished as often and as much as the distiller chooses, who by this means moderates at pleasure the action of

the fire, and can even stifle it at once, by shutting the openings in the fire-place, and the passage of the smoke into the chimney.

As the vinous fermentation is a point no less important, and one of the principal requisites on which depends the success of the operation, and as this fermentation can only be conducted slowly in a moderate temperature, they take great care that the laboratories, in which the vinous fermentation is effected, be constructed on such principles that the rays of the sun can be prevented from acting upon the tubs containing the liquor subjected to fermentation, by means of windows with shutters made every where opposite to each other, that in extraordinary hot weather a current of fresh air may be obtained to cool the laboratory. The floor is paved with stones, on which from time to time fresh water can be poured, which cools considerably the temperature of the atmosphere in the laboratory; and in winter it can be warmed by means of one or more iron stoves, or, which is perhaps still better, a delft stove, which is made use of in several places in Germany, which are of a more equal, more moderate, and less stifling heat.

It must not be supposed that the distillers in Holland make use of a small quantity of malt, from a persuasion that no geneva can be obtained from the flour of rye, or any other grain, without that addition; the contrary is the truth: I have made several experiments with rye, without the least addition of malt; and I have always obtained the same quantity of spirit, but it was never of so pleasant a taste. This addition is only necessary inasmuch as it assists the fermentation; and that if it be used there is no occasion for so much ferment, and of consequence not so much essential oil is introduced into the liquor, which is the reason that the spirit is of a more pleasant flavour, and not so harsh as that which is made of rye, or any other flour. I must add in this place, that the Dutch distillers are extremely careful to make use only of such rye as is grown on a calcareous or sandy soil, and never employ, if they can possibly avoid it, any corn produced by a fat, clayey ground; and this is the reason why they make use of rye imported from Prussia, grown on a poor soil, and which, according to common report, is dried in kilns before

it is exported, and on this account is known in **Holland** by the name of dried rye; the grain is small, and very hard and dry; because this rye produces more spirit and of a superior quality to that which is drawn from the rye grown on a clayey soil, and because it contains less oily particles.

On comparing the process of the **Dutch** distillers with that followed in this country, it will be obvious, at first view, why the spirit, which is distilled, does not possess the perfection of **Dutch** geneva, either in regard to the flavour or salubrity; and all the questions to be proposed on this subject may be easily answered, from a mature consideration of the difference of these processes; and the prejudice entertained by many persons in this country as well as in **Germany**, that no spirit of the same quality can be produced in any other country, deserves only to be laughed at. These persons do not consider that geneva is a product of art, which neither depends on the oil nor on the climate of a country as wine does, and that if you employ the same materials, and observe the same process, the result must necessarily be the same; nor is it less evident, that as long as the distillation shall be effected on the principles hitherto observed in **England**, the perfection of **Dutch** geneva can here never be obtained. In order to obtain it, government must necessarily cooperate, by giving the distillers full liberty to act and proceed according to their knowledge and experience; and I may hazard, without the least danger, the assertion, that as long as the duty is laid either on the quantity of the wash, or on the capacity of the still, the above can never be attained, and the distillers to avoid their ruin will be obliged to have recourse to pernicious ingredients. In the former case, their interests prompts them to overload their liquids with too great a quantity of grain, which not only causes them to sustain a considerable loss of spirit, because the water, which acts as a solvent to saccharine matter, can only dissolve and keep in a state of solution a certain quantity of that matter; but after it is saturated, the rest of that matter is lost. It further results from thence, that the fermentation, on which the success of the operation chiefly depends, proceeds not as regularly as in regard to a well diluted wash; and on distilling this thick, and as it were

over-saturated wash, the distiller introduces into his caldron a great quantity of oleaginous particles, and of consequence into his spirit more essential oil, especially if the distillation be pushed on with vivacity; besides that this thick wash, from the rapidity of the distillation, is likely to communicate to the spirit an empyreumatic taste, which would obstruct its sale if the rectifier did not correct this fault by noxious additions.

In the latter case, the interest of the distiller demands that he must conduct the distillation rapidly, and with a violent fire; the result of which is, that all the essential oil rises with the spirit, and that it also must contract an empyreumatic taste. It further results from this rapid mode of working, that the distiller does not allow himself sufficient time entirely to empty his caldron, or to clean it carefully, as well as the other utensils; which in my judgment must have a strong influence on the salubrity of the spirit on account of the verdigris, which, from want of cleanness, forms itself into the caldron and worm, if they are made of copper; and as the distillations succeed each other in so rapid a manner, the distiller cannot allow the liquor sufficient time to ferment slowly; he must therefore make use of more ferment, which cannot but produce a bad effect, both in regard to flavour and salubrity. They who assert that a rapid distillation has no influence upon the taste and flavour of the spirit, either try to deceive, or are ignorant of the first principles of the art of distillation; and in order to confound them, we have only to ask this question, Why are we obliged to distil fine and delicate liquors in *balneo mariæ* (a bath of water) to give them that fine flavour which causes them to be so much esteemed? The answer is, because in this case, the action of the fire is not immediately directed against the vessel which contains the liquor, and because the heat is equal and uniform, and cannot be encreased by the vivacity of the fire, because water which is in a state of ebullition cannot assume a higher degree of heat, and thus the liquors cannot contract any empyreumatic taste. If the fire had not any influence upon the spirit, these precautions would certainly be fruitless.

Persons who are of opinion that a rapid distillation has no influence upon the salubrity of the spirit, are equally mistaken. No one endowed with common sense, and possessed of the least know-

ledge of the art of distillation, can call it in question, that by a violent fire all the essential oil must be made to rise with the spirit, and the fiery and indigestible qualities of this oil, so copiously mixed with this spirit, are too well known to admit of the least doubt. They not only possess the property of intoxicating quickly, and causing head-ache, but also effect so very strongly the nervous system, as to cause a trembling when taken in any excessive degree ; and in general it may be fairly asserted, that adulterated spirits possess the quality, in common with bad wine, of causing head-ache and trembling when drunk in an extravagant manner ; which is not the case after an excess committed in drinking good and pure wine : and I rather incline to think, that by this rapid distillation some particles of copper are disengaged, and rise and mix with the spirit, because the wash contains some small quantity of acids, which with the aid of an excessive heat acts upon the metal, as all other acid solvents do upon metals in proportion as they are assisted by heat ; and this is perhaps the reason of the blueish colours discernible in spirit distilled by a violent fire.

But supposing that a rapid distillation cannot produce any effects hurtful to health, *per se*, it is at least self-evident it is excessively pernicious in its consequences, because the rectifier is absolutely obliged to employ poisonous ingredients for the purpose of destroying the empyreumatic and unpleasant taste, which the essential oil has communicated to the liquor ; and which simple rectifications, however multiplied, cannot by any means effect.

Before I explain these means it will be necessary to observe, that unprincipled distillers, in employing these means, have two different objects in view ; namely, to destroy the bad taste of the spirit ; and, secondly, to increase the quantity of spirituous matter, and thus to procure by those additions a greater quantity of spirit from a given quantity of wash than they could obtain by a natural process.

To obtain the former object the distillers make use of pure alkali, caustic alkali, and Glauber's salt, which possess a peculiar quality to absorb the essential oil ; but on the other hand, they communicate to the spirit their most volatile particles, which their great volatility renders extremely pernicious, and also impart to the liquor an extremely urinous taste, not less unpleasant ; in or-

der to destroy which taste, they are obliged to make at the same time use of acids, such as the sulphuric, muriatic, and nitric acids: others employ the crystals of verdigris, or radical vinegar (acetous acid) distilled from crystals of verdigris; or the acid from iron or copper vitriol. These ingredients destroy, in some measure, the bad taste, without increasing the quantity of spirit: for the purpose of attaining the latter end, they have recourse to oleaginous aromatics in general and vegetable oils, which possess an uncommon power to augment the quantity of spirit; but to produce this effect they must be mixed with the liquor before the fermentation: for this purpose they are triturated with a little sugar in a mortar, and by this means they would considerably retard the fermentation; but the use thereof, in order to derive from them all possible profit, requires a peculiar mode of conducting the vinous fermentation. When the distillers wish to give their spirits a vinous taste, they digest strong nitric acid with alcohol for some time, and distil it afterwards, which produces a dulcified nitrous acid, and mix a little of this acid with their spirit, which gives it a flavour resembling that of French spirit of wine.

These are the principal means which the distillers generally make use of: they are very seldom employed in Holland, and by no means necessary for the interest of the distiller. Their mode of proceeding yields spirit of a pleasant and agreeable flavour, and in great quantity; and no artifice can ever equal the taste and flavour which a slow operation, in every stage and part of the process, naturally imparts to the spirit. I must suppose that these practices are more common, if not generally resorted to, in this country; but as chemistry furnishes a great many simple means to discover the alkali and acids in the liquor, the officer whom government employs for the purpose cannot but find it a very easy task to detect the fraud; for example, solutions of bodies precipitated by alkalis, such as vitriol of iron, but chiefly alum mixed with small quantities with a little of this spirit, will immediately show the presence of alkalis by a precipitate, and the change which acids produce in blue vegetable colours will prove their presence. A bit of paper tinged with litmus put into the

spirit, tincture or syrup of violets, into which are poured a few drops of the spirit, manifest immediately the presence of these acids. Severe punishments inflicted on these fraudulent distillers, who sacrifice to their avarice the health of their fellow-citizens, will go a great way in preventing these frauds; and they would doubtless cease entirely if the duty were laid on the product of the labour of the distillers, that is, on the spirit, or to be paid immediately from the malt or corn, as is done in Bremen, where the distiller pays the duty at the mill, to which he carries his corn to be ground for the use of his distillery, and thus is exempt from all constraint during the whole course of the operation.

The only point which I have yet to consider is, whether there does not exist a method to accelerate considerably the distillation without running any danger of experiencing these bad effects. To this I cannot but answer in the affirmative: you have only to substitute shallow caldrons in the room of deep ones; their diameter must be larger, and they must have a concave bottom. I have made several experiments with a caldron constructed in this manner, and the result was always a purer spirit, and in a greater quantity, with a saving of ten-twelfths of fuel. The reason is this, that a large surface of liquor being exposed to heat, the liquor is heated in a more speedy and even manner in all its parts by a less brisk and strong fire, and evaporates with uncommon rapidity, and can neither contract an empyreumatic taste, nor can much essential oil rise and mix with the spirit, as the power of the fire must be greatly inferior to that which is employed under a common still, where the lower parts of the liquor experience a violent fire before the higher parts are sufficiently heated, and wherein the liquor continues a longer time exposed to the action of the fire, in proportion as the evaporation proceeds more slowly; and this diminution of heat is perhaps the reason why more spirit is obtained, because some part of the finest spirit cannot fail to evaporate when the distillation must be pushed on by a brisker fire; but in this case it is unavoidably necessary that the fire-place be constructed on the principle above described. For the same reasons it is obvious, that it is very profitable to effect the distillation in small caldrons, especially if they are of the

common cylindric form, both in regard to the quantity and quality of the spirit, and also with respect to the fuel: you will not, for instance, draw so good a spirit, and the same quantity, in a caldron of eighty gallons, as in two of forty each; the latter will be emptied twice, and oftener, in the same time which is necessary to empty the large caldron once, and with less fuel, and thus the produce of these two small caldrons will be double of that of a large one in a given time. Before I conclude I must make this observation, that it is extremely easy to make the spirit appear less strong at the proof with the hydrometer. All bodies which are easily dissolved in spirits, and augment their specific gravity, produce that effect; and the sulphurous acid possesses the property in a peculiar degree. Before you subject the spirit to the proof with the hydrometer, you should endeavour to discover the presence of this acid by the proofs above mentioned; and every distiller of fine liquors knows perfectly well, that as soon as he mixes a little sugar with his liquor to sweeten it, the hydrometer loses its effect; but it is extremely difficult to make it appear stronger than it actually is at the proof with the hydrometer. This end cannot be attained but by mixing it with bodies of less specific gravity, such as ether, which, on account of its high price, will not be made use of. I say, at the proof with the hydrometer; for this is widely different from the phial proof, because, on mixing a little oil with spirit, so much diluted by water that no more bubbles appear, they may be immediately made to reappear. The petty innkeepers in Holland are extremely expert in this trick; they commonly employ oil of olives, poppies, nuts, or almonds, and in general all sorts of oils, which do not give the spirit a bad taste. These frauds are discovered by diluting these spirits with a great quantity of water, when the oil immediately appears on the surface of the liquid. Before I conclude, I shall here touch upon the question, Whether the residue of the distillation can serve to nourish and fatten cattle? On analysing corn, we find that it consists of an earthy or mucilaginous and a saccharine matter, and of oil and salt. If we further consider, what I have already frequently mentioned, that the saccharine matter, which exclusively yields the brandy, and that the mucilaginous and earthy matter, together with the salt, remain untouched in the

residue, it will not be doubted that this mucilage with the salt cannot but be very nourishing. Experience has proved, in Holland, that this residue, which is there called *toefol-drunk*, possesses very nutritious virtues; the number of pigs which the distillers yearly draw from Westphalia exceeding all belief. They are fattened in a very short time for the use of the navy and merchants, who employ them on board ships for the subsistence of the seamen, who are not supplied there with beef as they are in this kingdom: while other distillers fatten with this residue bullocks and cows; and it is a circumstance worthy of notice, that cows fed with this residue give a considerable quantity of milk. It is thus that the Dutch distiller draws some profit from every thing; nothing is lost with him, and this economy is in general the cause of the low price of geneva.

REMARKS.

Mr. Crookens appears to be ignorant of the utility of charcoal in depriving still burnt liquor of *empyreuma*, and supposes that this is only to be done by noxious ingredients; and as he declines to detail the mode pursued by the Dutch distillers in procuring and preserving their ferments, under the pretence that it is not necessary to the elucidation of the question before him, (although it is clear, that if any part of the process required explanation, that one did, upon which depends so much of the success of the whole operation,) the editor in order to supply the deficiency, has consulted another authority,* a practical distiller, whose work bears every mark of experience.

“By ferments, we mean any substance, which, being added to any rightly disposed fermentable liquor, will cause it to ferment much sooner and faster than it would of itself; and, consequently, render the operation shorter; in contradiction to those abusively called so, which only correct some fault in the liquor, or give it some flavour. Hence we see, that the principal use of ferments is to save time, and make dispatch in business; whilst they

* The Complete Distiller. By A. Cooper. London, 1800.

only occasionally, and, as it were by accident, give a flavour, and increase the quantity of spirit. And, accordingly, any fermentable liquor, may, without the addition of any ferment, by a proper management of heat alone, be brought to ferment, and even more perfectly, though much slower, than with their assistance.

These ferments are, in general, the flowers and fæces of all fermentable liquors, generated and thrown to the surface, or deposited at the bottom, either during the act of fermentation, or after the operation is finished.

Two of these are procurable in large quantities, and at a small expense; we mean beer-yeast and wine-lees; a prudent and artificial management, or use of which, might render the business of distillation much more facile, certain and advantageous.

It has been esteemed very difficult, and a great discouragement in the business of distillation, to procure a sufficient stock of these materials, and preserve them at all times ready for use. The whole secret consists in dexterously freeing the matter from its superfluous moisture; because in its fluid state, it is subject to a farther fermentation, which is productive of corruption; in which state it becomes intolerable fœtid and cadaverous.

The method of exposing it to the air till it has acquired a proper consistence, is subject to great inconveniencies; and so peculiar and careful a management necessary, that it rarely succeeds.

The best way, therefore, is to press it very slowly and gradually, in a thick, close, and strong canvass bag, after the manner of wine-lees, by the tail-press, till it becomes a kind of cake; which, though soft, will easily snap, or break dry and brittle between the fingers. Being reduced to that consistence, and closely packed up in a tight cask, it will remain a long time uncorrupted, preserve its fragrantcy, and consequently, fit to be used for fermenting the finest liquor.

The wash being brought to a tepid, or lukewarm state in the backs, a proper quantity of a good conditioned ferment is added; but if the ferment be solid, it should be previously broken into small pieces, and gently thinned either with the hand, whip, &c. in a little of the tepid liquor. A complete and uniform solution, however, should not be attempted, because that would greatly

weaken the power of the ferment, or destroy its future efficacy. The intended quantity, therefore, being thus loosely mixed with a moderate parcel of the liquor, and kept in a tepid state, either by setting it near the fire, or otherwise, and free from the too rude commerce of the external air; more of the insensible warm liquor ought to be added, at proper intervals, till at length, the whole quantity is properly set to working together. And, thus, by dividing the business into parts, it may much more speedily and effectually be performed, than by attempting it all at once.

The whole quantity of liquor being thus set to work, secured in a proper degree of warmth, and defended from a too free intercourse of the external air, nature itself, as it were, finishes the process, and renders the liquor fit for the still.

Experience has demonstrated, that all ferments abound much more in essential oil, than the liquor which produced them: and consequently they retain, in a very high degree, the smell and flavour of the subject. It is therefore requisite, before the ferment is applied, to consider what flavour is intended to be introduced, or what species of ferment is most proper for the liquor.

The alteration thus caused by ferments is so considerable, as to render any neutral fermentable liquor of the same flavour with that which yielded the ferment. This observation is of much greater moment than will presently be conceived; for a new scene is hereby opened, both in the business of distillation, and others depending upon fermentation. It must, however, be observed, that its benefit does not extend to malt, treated in the common method; nor to any other subject but what affords a spirit tolerably pure and tasteless: For, otherwise, instead of producing a simple, pure, and uniform flavour, it causes a compound, mixed, and unnatural one. How far the fine stiller may profit by it, well deserves his attention; and whether our native cyder spirit, crab spirit, &c. which have very little flavour of their own, may not, by this artifice, be brought nearly, if not entirely, into the state of some foreign brandies, so highly esteemed, is recommended to experience."

Some little inconsistency is to be remarked in the paper by Mr. Crookens.—In one place he says, that a rapid distillation is

injurious to the salubrity and flavour of the spirit, p. 33 ; and in another, he allows that there are means to accelerate the distillation without experiencing those bad effects. The remedy is a still, differently formed from that in common use. Probably he means to apply the first remark only to deep stills. A very able distiller, Col. Alex. Anderson, of Philadelphia, whose improvements in the art have tended very much to increase the quality of our home liquor, is of opinion, "that the quality of the spirit is determined in the *act of fermentation* ; the form of the still having nothing to do therewith ; the act of distillation being a mere separation of the spirit and water ; hence those who can do most in a given time, at the least expense of fuel and labour, will succeed best."*

On the subject of the influence of the form of stills, upon the liquor distilled, the following remarks† of a late French writer, Mr. Curaudau, are highly worthy of attention.

"When Mr. Chaptal pointed out the fault of our common stills, and proposed to substitute for them broad and shallow alembics, I was one of the first to consider the reform as very useful, and at the same time highly conducive to the interest of the distiller. Accordingly, having had occasion to write on the same subject, I proved, that I coincided in opinion with Mr. Chaptal, by extolling the advantages, that shallow stills possessed over deep ones.

"Though I had no foundation for my opinion but theory, and the particulars advanced by Mr. Chaptal in support of the system he proposed, I was far from thinking that I should have to retract the assertions I had made, and that experience would destroy the plan of reform, the adoption of which I had sought to promote.

"However, as it is the duty of a man, who studies useful improvements in the arts, not to compromise the progress of science, or sacrifice to self-love whatever tends to correct the errors into which he may have fallen, I hasten to communicate to the

* Letter to Editor. For an account of Mr. A's improvements—see the Domestic Encyclopedia.

† Sonini's *Bibliothèque Physico-Economique*, 1808, tom. 1. p. 106.

physical and mathematical class of the Institute, the observations that have arisen from the objections made to me by those who have employed shallow stills.

“In deep stills, the liquor, at a certain time, receives more heat than it gives off by evaporation: the temperature then may rise, till it reaches the term at which the ebullition is complete, an essential condition for effecting the combination of the alcohol with the aroma of the wine, before it is separated from it.

“No doubt shallow stills greatly shorten the time of distillation; this is a fact, on which all distillers agree: but they say too, and this cannot be disputed, that the brandy obtained in this method contains nothing or next to nothing of that aroma, which is so grateful to the smell, and communicates the agreeable flavour, that distinguishes well made brandy.

“It is this difference in the quality of the products, that has engaged the attention of distillers. I thought at first, that they might have been deceived by their prejudices, and boldly disputed their opinion: but finding, that shallow alembics fell more and more into disrepute, I resolved to examine for myself, whether the objections made to them were well founded. What I thought it particularly necessary to ascertain was, whether the difference in flavour between brandies distilled in alembics of the different forms were sufficiently perceptible, to authorize the preference given to one over the other. Accordingly I subjected to distillation a quantity of wine, part in a shallow alembic, part in one of the common construction.

“When I had finished the distillation, I examined both sorts of brandy, and gave them to different persons to taste, all of whom, as well as myself, uniformly gave the preference to that produced from the deep still. Thus I was convinced, that the objections of the distillers were not the result of unfounded prejudice; and that the difference observed in the products of two analogous operations must depend on the circumstances of the evaporation; which were not the same in the two stills, since I satisfied myself, that, in the common still, the evaporation of the spirit does not begin to be very copious, till the heat is 70° or 75° of *Reaumur* (190° or 200° *F.*), while on the contrary in the shallow still it is very abundant from 45° to 55° (133° to 156° *F.*).

"This difference in the intensity of the heat produced, at the moment when the alcohol separates from the liquor that contains it, appeared to me worthy of remark, and tending to explain why the products must differ. In fact, is it not well known in chemistry, that wine distilled at the heat of a vapour bath yields a spirit much inferior in quality to that which is produced by distillation on a naked fire ?

"Experience proves then, that it is necessary to bring the wine to boil, before the alcohol is abstracted from it. This boiling favours the reaction of the principles of the wine, and is the cause of a new combination by their mutually acting upon each other, which renders the spirit more aromatic and highly flavoured, than that obtained from wine, to which a similar degree of heat has not been given.

"To explain why the liquor cannot be raised to the same degree of heat in a shallow still, as in a deep one, it is sufficient to observe, that, in the former, the evaporation always keep pace with the heat produced : in other words, if we increase the fire, we only accelerate the evaporation, without preceptibly increasing the temperature of the fluid.

"Hence it is evident, that shallow stills are far from being well adapted to attain this end ; and the circumstance that is essential to fit them for a speedy evaporation, is here a defect, instead of an advantage, in proportion to its efficacy.

"From what has been said we may conclude :

"1. That shallow alembics, though very fit for the distillation of certain fermented liquors, may sometimes alter the quality of the products of distillation.

"2. That the inconveniences arising from the employment of shallow alembics in distilling wines, arise from the facility with which evaporation takes place in them.

"3. That a high temperature is always necessary, to carry over the peculiar aroma of the wine, and perhaps too that arising from the action of heat on the principles of the wine.

"4. That deep alembics ought to be preferred to shallow ones for the distillation of wine.

“Lastly, that the best dimensions for an alembic, without regard to its figure, must be such, that the surface of the liquor heated shall be constantly greater than that from which the evaporation takes place. Thus for instance, we may consider it as a rule, that the proportion between the two should be as four to one.”

From the practical observations of Mr. Curaudau we may infer, as indeed he hints in his first general conclusion, that the shallow still is preferable, where the object is to prevent the peculiar flavour of the liquor distilled as much as possible from rising, as in distilling from malt, or molasses*; and this not only on account of the saving in time and fuel, but of superiority in point of flavour. On the contrary, in respect to the simple or spirituous distilled waters, as they have commonly been called, where a full impregnation with the peculiar flavour of the vegetable substance employed is desirable, a deep still would appear to be preferable. The proper proportions for stills for some of the finer productions of this kind, however, may deserve a particular inquiry. (*Note by Nicholson—Journal No. 108.*)

ON SESAMUM, OR BENE PLANT.

THERE are three species of sesamum, *s: orientale*, *s: indicum*, and *s: luteum*. It is only of the first species that I shall speak. It is an annual plant, rising with an herbaceous erect stalk about three feet high, sending out a few short side branches, leaves veined opposite and a little hairy; flowers in loose terminating spikes, small, of a dirty white colour; seeds ovate acuminate, compressed a little, smooth, whitish.

It is highly probable that the Sesamum plant was introduced into S. Carolina and Georgia, by the African negroes imported at an early period after the settlement of that part of the country; and there can be no doubt of the plant having been continued by them, for the purpose of adding to the various articles of vegetable aliment, as corn, sweet potatoes, and rice, of which their

* Or in attempting to procure an insipid liquor from rye. EDIT.

diet chiefly consists. They also parch the seeds, and after bruising them in a mortar, make them into soup, which they season with salt and pepper. The seeds parched and ground with an equal quantity of cocoa, make an excellent chocolate.

The first public notice taken of the superior oil which the seeds yield, was by the late Mr. Morell of Savannah; who, in a communication to the American Philosophical Society, in the year 1769, and published in the first vol. of their Transactions, in 1771, observes, that "the seeds make oil equal in quality to Florence, and some say preferable. Some say, one hundred weight of seed will produce ninety pounds of oil, others say less."* Romans† says, capt. P. M'Kay, of Sunbury, in Georgia, told him that a quantity of the seed sent to Philadelphia, yielded him twelve quarts per bushel." This account has been confirmed by others.

In 1805, I received some seeds from Georgia, and placed them in the hands of B. M'Mahan, nursery and seedsman, for gratuitous distribution, and in a paper in Dr. Coxe's Medical Museum, vol. 2. I noticed Mr. Morell's account of the oil, and also the utility of the leaves in dysentery.

Within two or three years, Mr. Few, of N. York, but formerly of Georgia, commenced the business of expressing the oil for sale:—I have used part of one bottle, two years old, for sallad, during the last year, and can say with safety, that to my taste, it is equal to the finest olive oil I ever tasted. Several bottles of it were also used at the table of the late President Jefferson, during the last year of his administration, and much approved of. The oil is clear and light coloured, and somewhat thinner than olive oil. It has moreover this great advantage over the olive oil, that it does not become rancid by exposure to the air. The remains of the bottle used in my family last year, are now as sweet as when it was opened. This quality was long since remarked by Romans, who adds, that the second expression, which is procured by the addition of hot water, is muddy at first, but on standing, it will deposit a white sediment, and become limpid as the first running. The

* A keg of the seeds was sent to the Society by Mr. Morell, but no attempt was made to cultivate the plant.

† Account of Florida, New-York, 1775.

oil is at first of a slightly pungent taste, but soon loses that. Last year I received a half rice tierce of the seed, which I sent to Mr. Garnet of New-Brunswick, to press, and hope soon to receive the oil from him.* Should it prove equal to that which I now have, I will use no other as an article of diet.

When we reflect upon the immense quantities of every species and quality of oil which are consumed in medicine, diet and the arts, we cannot entertain a doubt of the ready and extensive sale, and profit that would attend the cultivation of the *Bene plant*.

Hitherto, the great profit attending the cultivation of cotton, would not permit those who had land fit for it, to listen to the suggestion of the probable advantage to be derived from any other crops; but the circumstances of the world are now changed. The great tracts of our country at present devoted and devoting to the cultivation of cotton, added to the political situation of the old world, has lessened the demand for the article, and consequently diminished the price of it. The late embargo too, which the unjust conduct of the warring powers of Europe forced the American government to adopt, and which deprived them of our cotton, have induced France to grow it largely in her southern regions, and to stimulate the Italians to a more extended cultivation of it than hitherto. In the last *expose* of the situation of the country by the minister of the interior; it is said, hopes are entertained that France and Italy will be able shortly to supply all the cotton that the two countries may require. England also, besides her West-Indies will receive it from Africa, where great exertions are making to raise it, and whence too, it is known one or two vessels arrived last year in England with the first cargoes of the article; it is probable that the cotton of Africa, will be for some time inferior in quality to the cotton of the United States, but practice will make perfect, and we shall not for a long time find any sale for our cotton on the continent, owing to the powerful influence of the French emperor: all these causes combined, must necessarily diminish the price of cotton, and ought to show the planters of

* Mr. Garnet has erected a wind-mill upon a new construction to grind grain, crush flaxseed, &c.

the southern states the necessity of turning their attention to the raising of new articles of commerce.

Mode of Cultivation.—Mr. Morell directs to sow the seed in holes about three feet apart, dropping in each about ten grains, and when up, the plants are to be thinned to three or four of the most promising. The seeds will appear (in Georgia) in September, and when full grown are to be gathered in before they become dry. The method is as follows:—as soon as you perceive about three-fourths, or four-fifths of the pods ripe on the stalk, and the lower pods begin to lose their seeds, it is time to take it in, for after that, as much as ripens one day at top, so much falls out of the pod at bottom: then take a sharp hatchet bill, or some such weapon, and with it cut off the stalk, twelve to eighteen inches below any of the seed, holding the stalk with the left hand; and when cut, a second person is to receive it, keeping it upright, till he has his load; if turned down, the ripe seed will fall out of the pods. It is then to be carried to a barn and set upright on a close floor, or left in the field, till all the pods are fully ripe and open; then threshed and sifted.

The *dibbling* plan recommended by Mr. Morell, would be very tedious, even in the southern states, if pursued extensively; for cheap as the labour of slaves is, compared with our northern cultivation, there are few estates, where the time which a more expeditious mode of cultivation would save, might not be profitably employed. It is probable, that the seed sown broad cast upon land properly cleansed, and harrowed in, would answer well. Whether it would be necessary to mix sand or ashes with the seed, to insure a regular crop, and the quantity of seed per acre, are matters which the experience of a year or two would teach. If however the drill system is preferred, the seed may be dropped from a common turnip drill, and sown eighteen inches apart, and the intervals kept clean by the horse hoe, or hand hoes. Sickles, or reaping hooks might be used to cut it down; the early morning after a heavy dew, or a misty day, should be chosen, to prevent the dropping of the seeds.

The stalks may be tied up in small sheaves, and set up against the fence or the side of the field, where the immature seeds would

speedily ripen. The direction of Mr. Morell, to begin to cut before all the seeds are ripe, should be strictly attended to, otherwise great loss will be sustained in cutting and removing the sheaves. In leading them to the barn from the field, care must be taken to have the carts tight, in order to save the seed which may shell out ; and if a coarse cloth be spread on the bottom, the quantity of seed saved would be much increased.

One of the objections which may arise to the cultivation of *Bene* for oil, is the want of a mill to crush the seeds. I shall endeavour to supply this want, in a future number of this work.

I have recommended the *Bene plant* to the enlarged notice of southern planters, solely on account of the oil it yields ; but it is also worthy of attention by reason of the medicinal qualities of its leaves. This fact alone ought to entitle it to cultivation on every farm in the southern and middle states. The dysentery, a disease that frequently ravages our country settlements, yields very readily to an infusion of the leaf in water. In the year 1803, during an epidemic flux, which raged with great violence in the upper country of South Carolina, this remedy was attended with the best effects. Three or four leaves infused in a pint of cold water, will in a short time yield a thick mucilage, which may be given to the quantity of five or six pints daily. The infusion of the dried leaves is equally beneficial.

ACCOUNT OF THE SOCIETY FOR IMPROVING THE BREED OF CATTLE IN PENNSYLVANIA.

THE increasing spirit for improvement, of every kind, in Pennsylvania, and especially in Agriculture, and a conviction of the great influence which a well regulated Society would have in promoting the object of a general improvement of the breed of domestic animals, induced several gentlemen in Philadelphia and its vicinity, to associate last year, under the title of the "Pennsylvania Society for improving the breed of Cattle;" who have published the following address.

A NUMBER of persons concerned in grazing, and residing in and near Philadelphia, having formed themselves into a Society for the purpose of endeavouring to improve the breed of Cattle in the United States, but particularly in the State of Pennsylvania, beg leave to call the attention of those who are interested therein, to the important subject.

Although the neat Cattle of the northern states in general, are the best formed in this country, and after having had the advantage of good pasture, make as fine beef as any part of the world can boast of; yet it cannot be denied that there is much room for improvement. This is not to be wondered at, when it is considered, that in England, where the attention of numerous persons has been successively directed to the improvement of every species of domestic animals, for upwards of the last fifty years, it is acknowledged by the best authorities, that even at the present day, good cattle are extremely scarce, and of course command very high prices.

The present time is peculiarly favourable for the commencement of a change in our stock, and many circumstances combine to render the undertaking highly propitious.—The attention of more persons of capital, than formerly, is directed to the cultivation of the earth: the taste for education, and the means of obtaining it, are rapidly diffusing throughout the country: the spirit for settling our new lands is yearly increasing; our population is augmenting to a degree unexampled, owing to the enjoyment of peace, the productiveness of labour, and the freedom and

equality of our religious and political institutions, which invite the peaceful and oppressed from all nations to our shores.

We have moreover, another advantage of infinite consequence towards ensuring success to our attempts, viz. the experience of the European improvers. Their plans of procedure are detailed to us, the errors they committed in their first attempts are pointed out, and we know by comparison, the superiority of their present improved stock over their former breeds, and in some respects over our own. We may therefore avoid the errors which they acknowledge were committed, and may pursue without fear of failure, a line of conduct grounded upon principles, which their experience as well as our own, have shown to be correct.

The different dispositions, and qualities of cattle, are well known to all who have had any experience in the business of grazing. Some will come to maturity, or fatten much sooner than others ; in some the finer and more valuable parts are the heavier ; while in others, these are light, and the coarser abound : if then we consider the great difference in the profits to the breeder or grazier, in rearing or feeding one or the other kind of animals, the importance of propagating that breed, which possesses the more valuable qualities, must be apparent to all. Repeated observations have established the point, that such qualities are very generally connected with certain forms, and as the knowledge of those forms was hitherto only to be obtained by a course of experience, sometimes at much cost, or certainly at more cost than was desirable ; the Society are preparing a publication, which among other papers will contain the information requisite, and also directions and remarks, tending materially to assist the endeavours of those who are disposed to commence the improvement of farm stock.

For the purpose of knowing what cattle of improved breeds are among us, and to give an opportunity for the more easy diffusion of valuable stock, the Society have resolved to establish CATTLE SHOWS in the vicinity of Philadelphia. Notice of the time and place for holding these, will be publicly given, so as to enable the possessors to exhibit their stock.

Premiums are also intended to be offered for the best domestic stock of all kinds, and for improvements therein; the particulars of the premiums with the conditions, will be shortly announced.

Communications on the subject of improved stock, are solicited by the Society.

LAURENCE SECKEL, *President.*

Philadelphia, April 16, 1809.

As one of the most powerful means for the improvement of Cattle in the United States, public shows, naturally occurred first; and next, the offer of premiums for the best formed and most valuable animals; for beef or milk. By the first measure we shall be enabled to know the exact state and kinds of animals among us; we shall hear the observations and remarks of those who offer to public view what they think fine animals, and the less informed may thus learn; erroneous opinions of the young breeder may be corrected as to the forms of animals, or just ones be confirmed, by the exhibition of cattle of good proportions, which will be brought to the exhibition.

By the offer of premiums, for the domestic origination of superior breeds, the farmer who kills indiscriminately all his finest and most thrifty lambs, calves or pigs, because they bring a little ready money, will be induced, from the expectation of a higher reward, and of public praise, to reserve his best stock, and thus gradually improve the breed of the country.—We may not unreasonably expect too, that some of the foreign improved breeds of Europe will be added to our present stock. The OBJECT is of IMMENSE IMPORTANCE, and highly worthy the attention of those who have the means of rendering such essential service to their country.

But this is not the only good consequence that will flow from our Society. The spirited young cultivator when once informed upon the nature of various breeds, and made acquainted with the principles upon which he ought to proceed in forming his stock, will be induced to originate good forms by one or more careful and judicious crosses, and he will be induced to keep this

stock pure, because of the high prices which they will bring, when the public become fully aware of the superiour profit resulting from keeping such stock, over the common breeds of the country.

CATTLE SHOW.

THE first show of Cattle took place at Bush-hill on the 18th and 19th of July, and notwithstanding the rainy weather, and the confusion arising from the influence of an anonymous notice in the newspapers, that the show would be held on the 10th of the month, the company was numerous and the stock gave great satisfaction, and induces a belief, that the future exhibitions will be still more extensive and valuable.

The following cattle were shown on the first day.

1. A steer five years old, raised and shown by John Pearson, Esq. of Darby—large capacious carcase, wide hind quarters—a good figure.

2. A steer—good figure, broad deep body, straight back—weight 2030 lbs.

3. A spay'd black Heifer, from Berks county—weight 1512 lbs. small boned, fine limbed, small neck and head, straight back, broad rump, wide twist, in short an animal of uncommon symmetry and elegance of form. Scott's portraits of English prize cattle, show none equal to this animal.

The possession of a stock which would insure such animals as any of the above, might be considered a great acquisition in any country. We do not know the treasures we possess in the animal tribe; but it is to be hoped that the cattle shows will bring them forward, and also give rise to the introduction or origination of more.

4. A free martin* and an ox, twins—weight at turnpike scales, 23 cwt. 3 qrs. round compact figures, and very well made. They had been worked together.

5. A cow and a calf—the latter six months old—weight 644 lbs.—By Mr. Dubs.

* When a cow has twins, and one is a female, she never shows any disposition for the bull. Such are called free martins.

6. A cow four years old, which gives ten quarts at a milking, and her calf one year old, large size.—By Mr. James Coyle, Turner's lane.

7. Several rams and ewes of the Merino breed of sheep, 1-2, 3-4, and 7-8 blood.—By Col. Humphreys, from near New-Haven, Connecticut.

8. Two rams and two ewes of the Irish breed of sheep—one of the rams was six years old, and of great size; he was the sire of the largest wether, (live weight 276 lbs.) fattened by J. Hickman, and killed last spring in this city. The large ram was sold to Mr. Sloan, of New-Jersey, for 45 dollars. A ewe for 25 dollars. A lamb of this breed at four months old, weighed 94 lbs.—By Mr. Weston, near West Chester.

9. Two 7-8 blood Merino rams, and two 3-4 do.—One of the 7-8 had his last year's fleece on. He was left unshorn this season, in order to show that the Merino breed do not lose their wool like all other sheep, when the new coat is forming.

10. A broad tailed ram of the Barbary breed.*

11. A ewe of the new Leicester or Bakewell breed of sheep, so deservedly famous in England for speedy fattening. This excellent breed, notwithstanding the selfish policy of England,† exists in great purity near New-Brunswick, New-Jersey, on the farms of M. Smith, Esq. and Capt. Farmer. Tups are let readily at 200 and 150 dollars the season. The ewe shown is small boned, head small, neck neatly set on, body round and compact, loins broad, and the general appearance very handsome. She is one of 16 ewes from the stock of Miles Smith, Esq.—By Dr. Mease.

* For an account of this breed of sheep, see *Memoirs of the Agricultural Society of Philadelphia*, vol. 1.

† By a law passed in the 28th year of the present king's reign, any person sending a sheep, wether excepted, out of the kingdom, forfeits £. 3 for every sheep, and if detected suffers solitary confinement for three months. The vessel is also forfeited.

On the second day, the following cattle were shown.

1. A Suffolk polled cow, by Turner Camac, Esq. She gives 17 quarts of milk—of good form, small neck and head, and fine limbed.

2. Twin cows—21 months old, well formed, fine limbed. One had a calf three weeks old. The other was shortly to calve.—By Mr. J. Thornton, of Lower Dublin, Philadelphia county.

3. A bull 6 years old, bred by Joseph Sims, Esq. from a bull imported by Mr. Ketland, and an Alderney cow imported by Mr. Sims—large, full quarters, round body, very gentle. His calves are in great estimation.—By J. Clift, of Lower Dublin.

A very fine fleece, full blood Merino, was exhibited by James Caldwell, Esq. and samples liberally distributed. This gentleman in consequence of the late notice in the newspapers, that the show would be held on the 10th inst. brought a very fine tup lamb 6 months old to town, from his farm near Haddonfield, New-Jersey; which owing to the fatigue and the heat of the weather, died in this city the next day. He weighed 87 1-4 lbs. his fleece weighed 5 1-4 lbs. exclusive of some ounces not taken off from the under part of the body. The same spirited improver stated that he has this spring sheared 12 1-2 lbs. washed wool, from two yearling full blood Merinos, of his own raising.

Dr. Mease read an extract of a letter just received from Mr. Robert R. Livingston, of New-York, stating, that from a full blood Merino yearling ram, bred by himself, from stock which he sent from France, while he was our minister there, he cut 9 lbs. 6 oz. of wool, and that from a full blood ram, also procured at the *National Farm of France*,* he obtained 9 lbs.—the wool sold for two

*The French government for many years have had a farm exclusively devoted to the raising Merino sheep, under the care of an able man, for the purpose of affording the farmers an opportunity of supplying themselves with the breed; and it is a fact, that by superior attention, the form of the animal is not only improved, but the quantity of the wool obtained from them is treble that of the breed in their native country. The quality is also improved—and yet the sheep nevert ravel like the Spanish flocks: a full proof, among numerous others, that the change of climate is not necessary to the preservation of the quality of the fleece, as commonly supposed.

dollars per pound.—Samples of both were shown and greatly admired, being of silky fineness, and the staple unusually long.

The fact of the greater weight of the Gallo American fleece, shews sufficiently, if any proof were *now* required, that neither our climate nor our soil are unfavourable to the quantity or quality of wool.

The second show took place on the 24th, 25th, and 26th October, 1809.

The President of the Society produced a very fine black and white steer, which he purchased in March last, and had fed in his luxuriant meadows at Schuylkill point. The steer was raised in Lancaster county by Mr. Moyer, and gave great satisfaction, being of superior size, and of an excellent form.

Mr. D. Seckel and Mr. John Barney, sent two large cows; that belonging to the former intended for feeding*—the latter of better form was sold for 45 dollars, as a breeder, to Mr. Guier.

Mr. Serrill, of Darby, produced a cow from Mr. Ketland's bull, and her calf, both of which commanded attention. The cow was of good form, and the calf of great size for its age.

Mr. Rodman, of Buck's county, exhibited a heifer 4 years old, of great size, and good proportions, raised by himself.

Mr. Benjamin Wilson, of Lower Dublin, produced a cow of the Suffolk polled breed of a superior form, and an excellent milker.

Mr. Castor, of Frankford, sent a young bull, from the Dutch breed of Mr. Waln. He was sold for 40 dollars, to Mr. Guier.

Mr. Thomas Garrett, of Upper Darby, sent a ram lamb of the preceding season, the produce of a full blooded ram of col. Humphreys' stock, then in the possession of Dr. Mease, and a fine ewe of good size, of the Irish breed. The lamb was very fat, exhibited strong marks of blood, and was larger than his sire.

Dr. Mease exhibited several Merino sheep of various degrees of blood, being crosses between the descendants of rams imported by himself, and the above ram of col. Humphreys' stock.

Mr. Dubs again sent his handsome twins, which so justly excited admiration at the first show. According to the certificate

* This cow was killed 31st March last. She weighed alive 2082 lbs.—Beef 1325—fat 160—hide 106.

of the gate keeper, at the turnpike scales, it appeared that they weighed 27 cwt.*

The third show was held on the 3d of April last, at the same place.

Mr. Joseph Hart exhibited a noble red steer, 6 years old, fed for some months past by himself, but bred by Mr. Blanchard, of Morris county, N. J. Mr. L. Seckel again brought forward his noble black and white steer. Both those animals would have done honour to any country. Their beauty, gentleness, great fatness and majestic appearance, struck every beholder; but the connoisseur in cattle dwelt with pleasure upon their possessing those great and grand points, without which no animal, however large, however fat, can give satisfaction to a judge, or to the æconomical feeder.

Mr. Seckel also showed two very handsome, light boned, capacious, well proportioned steers, 7 years old, and in high order, weighing about 1200 cwt. one brown and white, the other strawberry and white.

Mr. John Johnson, of Germantown, exhibited a red steer about 6 years old, bred by himself, and in high order, and well proportioned.

* On the 3d April, they weighed 29 cwt. 2 qrs. 14 lbs.

The following are the dimensions of the above cattle, accurately taken.

	Girth behind shoulders.	Round neck.	Round loins.	Below knee.	Height over fore feet.	Height over hips.	Width across hips.	Length of carcase.
	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.	Ft. In.
Mr. Hart's steer,*	9	4	8 4	10	5 7	5 7	2 5	8 8
Mr. L. Seckel's steer,†	8	3 11	9	9½	5 4	5 6	2 5	9
Mr. Johnson's ox,	7	3 4	7 11½	8½	4 7	4 10½	2 2	8 1
Mr. Seckel's brownwhite ox,	8	3 7	8 3	10	4 11	5	2 2½	8 4
Mr. Seckel's strawberry and white ox,	8	3 9½	8 4½	9	4 9	4 10½	2 3	8

* Mr. Hart's steer is still feeding, and will be probably again exhibited next October.

† Mr. Seckel's steer was killed on the 5th of April—his beef weighed 1667 1-4 lbs. neat—fat, 234 lbs—hide, 125 lbs.

Mr. Guier showed two uncommonly handsome red oxen in high order, notwithstanding their having been worked during the last autumn and winter. They weighed alive 2520 lbs. Also, a bull, cow and calf, of the Dutch breed, from the stock of Mr. Robert Waln.

Messrs John Ely and A. Eastburn, brought a bull from Solebury township, Bucks county, of the Bakewell stock, and imported when a calf in 1804 into New-York. His form was deservedly admired: he now stands for public use at the farm of Moses Eastburn in the above township, and cannot fail to effect a great change in the form of the cattle in the vicinity. The zeal exhibited by the owners of this fine animal, in bringing him so great a distance (34 miles) called forth the thanks of the members of the Society. The farmers ought to be grateful for the spirit exhibited in the purchase of the bull at a high price, and for his introduction into this state—and also for the liberality in fixing the sum for his use so low as two dollars. His colour is a good red, and has a small list of white on his back. This latter mark distinguishes Bakewell's stock.*

Mr. Ketland sent a cow, the descendant of a very superiour one of the Teeswater breed,† imported by himself some years since.

Mr. Morton, of Southwark, produced two plates of hats—one made with 6 oz., 1-2 blood Merino wool—the other with 3 oz. Merino, 1 oz. racker, and 2 oz. rabbit. He stated that both worked up very well; thus affording another proof of the value of the Merino breed of sheep.

Col. Humphreys favoured the show with a last look of eight or ten 1-2, 3-4, and 7-8 blood Merino rams. Those precious animals, which had been on sale for some months in the neighbour-

* By an authentic certificate it appears, that the bull was imported by Mr. Musson and Daniel Adcock, in the ship Diana, capt. Glover, from Liverpool, in July 1804, when a calf: He is a grandson of Shakspeare which was bred by Mr. Fowler, and sold for 400 guineas at the sale of Mr. Paget's stock, in Nov. 1793.—See Complete Grazier, p. 12.

† This cow was sent back within two years after her arrival here, no one being disposed to pay her cost. Such an event it is expected would not occur at the present day.

hood of the city, bore very strong marks of the blood ; and it is to be regretted that they will be for ever lost to Pennsylvania, at least certainly to this part of the state, as they are on their way to the westward, where their value will no doubt be appreciated. Their prices are considerably enhanced since last year.

On the 4th., though not originally intended by the Society as a day of show, the following were sent, viz.—18 very fat and finely formed oxen, by Mr. Dubs. Mr. Paul Jones, of Lower Merion, exhibited a large and well shaped ram of the *new Leicester breed*, with some fine lambs by him. The excellent qualities of this valuable breed, and their origin with Bakewell are well known, and their progress through New-Jersey and Pennsylvania, which is becoming rapid, will add to the wealth of the individuals and of the country. Twelve or fourteen pairs of working oxen, and several horses were brought for sale. Agreeably to the plan of the Society, as announced in their last address, viz. to hold a sale for all kinds of farm stock, Mr. Freeman, one of the city auctioneers attended, but only one public sale took place. It is expected however, and hoped, that drovers, graziers and farmers, will avail themselves of the reciprocal advantages which the institution offers of both buying and selling, and that the next show, to be held on the 1st Tuesday of October, will be generally attended.

PREMIUMS PROPOSED BY THE PENNSYLVANIA SOCIETY FOR
THE IMPROVEMENT OF THE BREED OF CATTLE.

1. To the person or persons who shall introduce into the state of Pennsylvania, and keep for public use, a bull, (colour red, brown, or brindle) of the North Devon, Sussex, Teeswater, Alderney, or of any other foreign milk breed, which shall prove more valuable than the common breed of this country—*One hundred dollars.*

2. To the person who shall import and keep for public use, a bull either of the Hereford, North Devon, or of *any other breed*, whose stock shall be found to feed to the most advantage—*One Hundred Dollars.*

3. To the person who shall originate from our native stock, or from any other in the country, a breed of cattle, the cows of which

shall prove more valuable for milk, than the common cows of the country—*One Hundred Dollars.*

4. To the person who by selection and admixture, shall originate a breed of neat cattle, from our native stock, or other stock, which will come to maturity more speedily than our common cattle; yield the greatest weight of flesh off a given quantity of land; fatten in the shortest time, have least offal, and shall also abound most in the more valuable parts—*One Hundred Dollars.*

5. To the person who shall introduce and keep for hire in the counties of Philadelphia or Delaware, a full bred ram of the New-Leicester breed, (so highly valuable for a disposition to fatten speedily)—*Fifty Dollars.*

6. To the person who shall make the best set of experiments, to determine the comparative merit of the various breeds of hogs in this country, and who shall most clearly state and shew their general qualities or properties, particularly their easiness of keep and of fattening—*Fifty Dollars.*

7. To the person who shall by selection and admixture, originate a breed of sheep from our native stock, which shall fatten most speedily, and produce the most and finest wool—*One Hundred Dollars.*

8. To the person who shall originate a breed of cattle, which as workers prove superiour to all others, for speed of gait, easiness of keep, and fattening—*One Hundred Dollars.*

9. To the person who shall raise and feed ox, steer, or cow, whose weight of neat beef, shall be at least 1500 lbs. and have 300 lbs. of rough tallow—*One Hundred Dollars.*

10. To the person who shall feed ox, steer, or cow, of the above weight of beef and tallow—*Fifty Dollars.*

11. To the person who shall feed ox, steer, or cow, weight of beef immaterial, but whose rough tallow shall amount to 300 lbs. *Fifty Dollars.*

A condition of the three last premiums is, that the animals be killed in Philadelphia.

The Society have not thought it necessary, to offer any premium on the subject of Merino sheep, as the public ought to be fully aware of the very great and growing importance of this inva-

luable breed ; and it is apprehended that this conviction will be a sufficient inducement to our farmers, to lose no time in availing themselves of the means which are happily in their power to propagate it. Those who are insensible to the profit arising from the breed, are not to be induced to adopt it, by the offer of premiums. It ought to be deemed a full performance of duty by the Society, if objects of primary attention—those connected with the immediate wants of the country, are pointed out to the spirited and improving cultivator.

The Society will require the most rigid adherence to the terms of the premiums by the claimants ; and that in order to ascertain the merits of stock for fattening, the actual quantity and quality of food, and the expense and time of fattening, as well as the precise increase of weight of good flesh they have acquired, shall be accurately ascertained and fully proved.

LAWRENCE SECKEL, *President.*

Philadelphia, June 9th, 1809.

The ninth premium has been gained by Samuel Tomkins, of Gloucester county, New-Jersey, who sold an ox of his own raising, in April last, to Miller and Tallman, which weighed 1500 lbs. neat, and had 326 lbs. rough fat ! A committee of the Cattle Society attended the slaughtering and weighing of the animal. At the request of Mr. Tallman, the amount of the premium has been laid out in a piece of plate, which has been accordingly presented, with an appropriate inscription.

It has been very generally known among the graziers of Pennsylvania, New-Jersey, and Delaware, that the President of the Society has held out for several years past, a premium of 100 dollars to any one who would exceed the weight of a bullock fed by him, and which produced $278\frac{1}{2}$ lbs. rough fat, and $1495\frac{1}{4}$ lbs. of beef. Upon the establishment of this Society, it was deemed proper to take this premium upon themselves ; stipulating, however, that the claimant must have raised the animal, and to offer two others,* for the purpose of giving those who chose to try the experiment, an opportunity of showing the extent of good feeding, and to con-

* Nos. 10. and 11.

vince the old world of the great capabilities of the stock of the United States. But once gained, they will not be repeated: the Society being well convinced that such over ripe cattle do not pay for the extra quantity of food they consume, and attendance given, and that of course, however the self pride of the feeder may be gratified in the production of them, the object of the Society, which is radically to improve the stock of the country, is not promoted thereby, this being to introduce from abroad, or to originate at home, *such breeds as will fatten to the greatest sizes, and on the best parts in the shortest time; or, in other words, that will pay most and quickest.*

SPEEDY PROCESS FOR ROTTING HEMP.

From Bibliotheque Phisico-æconomique—By M. Braalle of Amiens.

M. BRAALLE, formerly an abbe, had long paid attention to the subject of hemp; and published a pamphlet on its cultivation and preparation, which was reprinted by order of the "Lords Commissioners for trade and foreign plantations," of England, in 1790. Successive and repeated experiments enabled him to discover a method of more speedily rotting the hemp, the account of which having reached the French Government, he was desired to come to Paris in 1801, to make a fair and public experiment of the process. He accordingly performed it before **M. Molard**, administrator of the conservatory of arts and manufactures, **Messrs. Monge and Berthollet** well known and excellent chemists, and **Mr. Tessier** celebrated for his æconomical knowledge;* upon their favourable report the minister of the Interior published the process of **M. Braalle** for general benefit. It is as follows: Provide a copper or brass vessel (iron will probably stain the tow) allowing rather better than one gallon and a half (wine measure)

* Editor of the "Annals de l'Agriculture Francoise."

in contents, per lb. of hemp: thus to work on 50 pounds of hemp the vessel should hold about eighty gallons. It should be in shape cylindrical, but if it can be set up on end (vertically) it answers still better. This quantity of hemp will require one pound or one pound and a quarter at the utmost of (*savon verd*, green soap,) soft soap, well made, and without lime, and not containing a superabundance of lye, (as our common family made soft soap often does,) but boiled till it has taken up a sufficient quantity of fat; that kind of soft soap, in fact, that will not chop the hands. Put this soap to as much water as, with the hemp to be put in afterwards, will nearly fill the vessel. Bring the water and the soap to a boiling heat, or near it; when it is a little under a boiling heat (200 deg. Fahrenheit's thermometer) put in the hemp, cover the vessel close, and draw out the fire, and let the hemp stay two hours. Take it out at the end of that time; cover it with straw that it may cool gradually. Spread it on the floor next day; and push the band to the top of the bundle; then run a heavy roller over it several times, which answers the purpose of beating. It peels easily, whether wet or dry. When peeled, tie it in bundles, and spread them on the grass for five or six days to bleach. Turn them, and after five or six days, they may be removed to the warehouse. If the hemp is intended to be stripped, not wet, but dry, spread the hemp stalk itself on the grass for that length of time to bleach it.

The quantity of soap necessary for a complete rotting, is to that of hemp as 1 to 48; and the weight of hemp to that of water, as 48 to 650.

The same water may be employed for fifteen days continually: care being taken to add soap after each steeping, to replace what has been absorbed, and to heat the water to the former temperature.

REMARKS.

A very good apparatus for the process, is formed by a boiler and wooden tubs, with covers for steeping-vessels.

In the old method for treating hemp, it is laid down on the grass and exposed to dews and rains for a month or six weeks,

being turned two or three times a week. This facilitates the separation of the tow from the stalk ; but this process takes away so much from the string of the tow, that government will not buy hemp thus manufactured.

Another method is, to steep bundles of hemp in creeks, ponds or ditches, from ten to twenty days according to the state of the weather ; the tow is thus rendered separable from the hemp stalk. In creeks, this method is liable to loss, and in ponds or ditches the mud and dirt hurts the colour and quality of the tow.

The advantages of **M. Braalle's** method are. 1st. The great expedition of the process. 2d. Its being practicable at all seasons. 3d. It is not injurious to health, and does not produce any bad smell. 4th. A saving of expense, when a proper apparatus is used in the operation. 5th. Superiority in the hemp so prepared, and less waste produced, so that nearly a fourth more hemp is obtained from the same quantity of raw materials. By the crooked and old process, 800 lbs. of hemp-stalks produced when steeped, pulled and beaten, 150 lbs. of pure tow ; by **M. Braalle's** process the yield is 200 lbs.

Mr. Cooper of Northumberland, Pennsylvania, has proposed to improve the process of **M. Braalle**, thus: "I suppose an establishment of one boiler holding eighty gallons, and three cylindrical wooden tubs or barrels near it. Fill the barrels with 50 lbs. weight of hemp each. Fill the boiler with water, and one pound and a quarter of soft soap ; when it boils let it run off by a cock into one of the barrels of hemp placed below. Cover it up, and while this is steeping fill the boiler for the second barrel. In less than an hour you can make the second eighty gallons boil ; turn it into the second barrel of hemp. Then boil a third portion of soap and water, and by the time it boils, you will be ready to empty the barrel of hemp first filled, and thus in a summer's day, one person can manage with ease 750 weight of hemp, if another be employed in taking it out and spreading it."

The green soap directed to be used by **M. Braalle**, differs from common soap, in being prepared with oil of hemp seed, instead of the common animal fats. It is of little consistence, and upon a slight addition of water assumes the form of a paste. From

the care taken to specify the green soap as the most proper to be employed in the process, we must suppose experience had taught him, that it possesses superior powers to the soaps made with other oils, and yet in the classification of various oils according to their aptitudes for making good soap, by the French chemists, * *hemp seed* oil is placed sixth on the list: from the known practice however by the manufacturers of colouring other soaps green, the probability is that the superiority of the green soap is generally acknowledged. Whether green soap is commonly used in Flanders, is uncertain; but a soap bearing the name of that country, was found by M. Roard, director of the dyeing establishment in the French National manufactories, to be superior to any other for scouring wool, "giving it a degree of whiteness which is extremely difficult to produce by any other means." See *Annals de Chimie*, No. 158.

I have taken measures to be informed of the particular reasons of Mr. Braalle for directing the green soap, and when enabled, will

* A great scarcity of this article was experienced in France, in 1793, when the civil commotions forced a great number of the manufacturers to relinquish their business: at this period other manufactories were established in different parts of the country, but the article was very inferior. The necessity therefore was felt of making more generally known the principles upon which the manufacturing of good soap depend. Three well known chemists being invited by the government to concur in the design, instituted a course of experiments for the purpose of ascertaining the best method of preparing soap, and the substances that deserved the preference in this manufacture. The chemists were Darcet, Pelletier, and Lelièvre. The experiments of those gentlemen enabled them to class the oils nearly in the following order, according to their different degrees of aptitude for forming good soap.—1. Oil of olives, oil of sweet almonds.—2. Animal oils, fat, butter.—3d. Oil of colza or rape.—4. Oil of turnips, oil of beechmast.—5. Fish oil.—6. Oil of hempseed.—7. Nut oil.—8. Linseed oil.

The oils of hempseed, colza, turnip, and linseed make a soft soap. They say, oil of hempseed yields a green colour—oil of colza or rape, a yellow soap. Linseed oil, which is colourless, may be coloured by the addition of a yellow or blue pigment—namely, curcuma for the yellow, and indigo for the blue: but as these different oils are usually employed mixed together, the manufacturers add during the boiling a mixture of curcuma and indigo when they wish to have green soap. By exposure to the air, it becomes white, and afterwards brown.

communicate the result of my enquiry. In the mean time the *common soft soap* of our country, not sharp, may answer.

The process of Mr. Braalle was published by the minister of the interior in 1803, after a public experiment had been made by order of the French government, before M. Molard, the administrator of the Conservatory of Arts and Manufactures: and the duke de Liancourt, in order to teach the process to the people of the district in which he lives, and who raise much hemp, made another trial of it, the next year, before many of the inhabitants who assisted thereat, and in presence of Messrs. Molard and Braalle who were invited to attend on the occasion. The common kitchen utensils were employed, and with the most complete success. The hemp after being rotted, was delivered in small quantities to all the women who assisted at the experiment, and they unanimously acknowledged, that it underwent with ease the ordinary operations, and that it had all the requisite qualities in a degree superior to hemp rotted according to the usual process.*

The above facts leave no doubt as to the utility of the process of Mr. Braalle; the adoption of it is therefore recommended to the American farmer,—the account of whose experiments will meet with a welcome reception by the Editor.

OBSERVATIONS ON SHEEP.

CHAPTER I.

IMPORTANCE of Sheep.—Division of the species as to fleece.—Encouragement to American Shepherds, from our climates and the health of our flocks.—Examples of successful attention to their improvement.

It is impossible for one practically acquainted with the oeconomy of this interesting part of the brute creation, and who is moreover impressed with a sense of the various and important uses to which every part of their body is applicable; to forbear paying them a tribute for the rank they hold in the scale of general utili-

* *Memoirs de la Soc. d'Agric : de Paris.*

ty. Without detracting from the acknowledged importance of the horse or of the cow, it cannot be denied, that sheep form an indispensable link in the chain of agricultural objects, and excite a peculiar interest in those, who are alive to the influence of the tenderness, the innocent gambols of the progeny, and to the expressions of affectionate solicitude of the female parent. While their flesh increases the supply of substantial and delicate food, their wool adds to the means of obtaining it, by furnishing ample employment to the industrious poor, by whose labour it is made to protect the irritable skin of the infant, to defend the hardy mariner or soldier from the winter's storm, and to "cherish and adorn the person of the prince."* Even the offals of his body are made to contribute to our necessities. We are indebted to his skin for the means of recording and preserving a permanent evidence to the titles of our property, and for other purposes; and even his bones are applied to various uses in the arts.

Connected with the culture and improvement of the soil, and consequent profit of the farmer, the value of sheep is great. They not only subsist, but fatten upon soils, too poor for the support of larger animals; and while they enrich the surface by a great quantity of manure, they save the trouble and expense of subsequent labour, by its equal distribution. They eagerly devour many plants and weeds rejected by other stock, and in particular rid our stubbles of the troublesome *ambrosia*†, alike exhausting to the land, and injurious to the dairy. But to the gentleman farmer, they are invaluable; they afford him the least hazardous employment, and the most rational amusement resulting from his experiments and trials to perfect his breed; and whether we refer either to the invaluable Merino, or to the common breeds, give the greatest and quickest return for the capital employed, with the least trouble or risque, of any species of stock: but above all, they enable him to diminish the number, and to circumscribe his confidence in servants, whose idleness and waste often detract much from the pleasures of a tillage farm.

The most general divisions of sheep, are into the long and short woolled: the one proper for combing, and worsted stuffs, and

* Lawrence on cattle. † Bitter weed.

coarse cloths, the other for carding and making fine cloths*. In Europe, and particularly England, those varieties are kept distinct with great care, from a conviction, the result of long experience, that a mixture of the long and short woolled breeds, produce a fleece, good for neither purpose. In the United States, with probably but few exceptions, little attention has hitherto been paid to this important point; the consequence is, that no particular breeds, until lately, could be named or distinguished as pure, being mostly mixed, and from the little attention paid to the selection of rams, a degenerate race had been produced, which called loudly for a change. The rapid increase, however, of our cloth manufactures, and the great spirit which is prevalent throughout most parts of the country for improvement in the breeds of our domestic animals, will no doubt point out to our farmers the indispensable necessity for close attention to the subject, and the great emoluments to be derived therefrom. In England, where attention has been paid for years to the improvement of stock of all kinds, and where we might suppose that especially in the case of sheep perfection had long since been attained, it is wonderful to hear of the continued exertions made to improve, and of the care they take to preserve the purity of their several varieties.

The general hardihood of the American sheep, their freedom from disease, and consequent multiplication, are fully sufficient to shew how well adapted the climates of the United States are to this invaluable breed of domestic animals: to prove also what capabilities there are for improvement, and what may be done by care, a few instances shall be given of the weight of sheep in different states, and the quantities of wool yielded by them. The general healthiness of our sheep, is indeed a most important consideration, and additional source of encouragement to a spirited extension and improvement of our stock. Their complaints are

* Even in the same fleece, various kinds of wool are found suitable to the fabrication of articles very dissimilar in their nature, and adapted to purposes in the manufacture of a description totally different from each other. The separation of these constitutes the business of the *wool stapler*, whose art shall be unfolded in a succeeding number of this work.

few and simple, and of course easily cured, whereas those that affect the sheep of Europe are numerous and very fatal; it is not uncommon for whole districts to be swept by epidemics, even the names of which are unknown here; and the solitary complaints that attack individuals, also require unceasing care and attention on the part of the farmer, from which we are happily in great measure relieved.

There is no reason to doubt the congeniality of every part of the United States, except some low marshy districts, to sheep of either the long or short woolled varieties. Even in the dry maritime parts of the states of South Carolina and Georgia, if shelter be provided, to which the animals will, of their own accord, naturally resort, I entertain no doubt of their doing well with care. Several spirited gentlemen of the first mentioned state, have made a beginning with the Merino breed, and from them we shall learn whether it will best answer to extend that race, or adhere to the coarser woolled. The western parts of those states, however, which are blessed with a very mild climate, either as it respects heat or cold, are peculiarly calculated for breeding sheep, because they would require little attention as to food, either winter or summer*, and should these remarks reach those distant regions, it is suggested to their happy citizens to turn their attention to the subject. The fleeces of their native stock are at present of a superior quality†.

Notwithstanding the general neglect and inattention which have prevailed with respect to the sheep in this country, there have

* Destruction from wild beasts may be avoided, by penning sheep at night near the house; a high pen of half an acre, might be made, and removed occasionally—no more certain method could be adopted to manure the land. After they have been driven up a few times at night, the sheep will regularly return home (as I well know) to the fold at the close of the day.

† Mr. Wm. Maclure informed me, that in a tour to the back parts of Georgia, the winter before last, he found at the bottom of the iron mountain, a district of country abounding with wool, the fineness of which excited his admiration. The inhabitants abound in every thing which moderate ambition could wish for. They bought nothing except salt. Their houses were filled with clothing from the fine wool mentioned, mixed with cotton, of which article, they raised immense quantities, and woven by themselves.

been some in several of our states, who have considered them in the light they deserved, and whose success not only shows the congeniality of the climate to their constitutions, but also establishes the important point, that the imported varieties do not degenerate in the United States. More facts of this kind will be given, when treating of the Merino breed.

Among the improvers of domestic sheep, Mr. Custis, of Arlington, near Alexandria, certainly stands conspicuous. By repeated crosses with a foreign stock, he has greatly lengthened the staple of our common wool: he has brought to view, and I hope will bring into action, the native Smith-island sheep, which for fineness and length of staple, promise to be a valuable acquisition to our stock of combing wool; and by his offer of premiums for improvement in native sheep, and his annual public shearings and shows, he has roused and fostered a spirit, which it is to be wished will continue a long time to increase.

At Mr. Custis's show, on the 30th of April, 1805, the following were exhibited.

Bakewell, the prize ram, of one year old, bred by Col. Thomas Ludwell Lee*, of Loudoun county, Virginia—Weight of the fleece, 12 lbs. 5 oz.—length of the wool, extreme 13 inch. in ordinary 11 inch.—gross weight of the carcase, one hundred and forty pounds. The extreme length of the animal from the nose to the buttock, 4 feet 9 inches; the girth of the body 3 feet 7½ inch.; and the length of the fore leg from the brisket to the ground 12½ inches. The above dimensions, and gross weight of carcase, were taken after shearing.

Four prime ewes were then shorn, bred by Mr. Custis, from the imported ram, upon the improved Mount Vernon breed:

No. 1. Weight of the fleece, 7 1-2 lbs.

— 2. - - - - 7 1-4 —

— 3. - - - - 6 3-4 —

— 4. - - - - 6 1-2 —

A ram lamb of two and a half months old, weighed gross eighty-one and a half lbs.

* Mr Lee was a highly respectable character, an excellent farmer, and passionately devoted to the improvement of his sheep. His death, which took place in 1806 or 1807, may be considered as a public loss. At that time I was informed that his flock was distinguished for their beauty.

At subsequent shows, the following were exhibited.

1. An ewe of one year old, estimated at 7 lbs. per quarter—fleece 7 lbs.—length of wool 9 inches.

2. A ram lamb of one year old, carcase 10 lbs. per quarter—fleece $7\frac{1}{2}$ lbs.—length of wool 9 inches.

3. A ram lamb of one year old, carcase 11 lbs. per quarter—fleece $7\frac{1}{4}$ lbs.—length of wool 8 inches.

4. An ewe lamb of one year old, carcase 8 lbs. per quarter—fleece $5\frac{3}{4}$ lbs.—length of wool 8 inches.

The lambs were all bred from Bakewell, the prize ram of 1805, and crossed upon the last improvements.

Superb, a lamb of one year old—weight one hundred and eighty pounds.

Badger, by Mr. Foote, of the Arlington long woolled breed—fleece 9 lbs. 3 qrs.

A lamb by Mr. Ludwell Lee—weight 161 lbs.—fleece $7\frac{3}{4}$ lbs.

Mr. Osborn Sprig, of Northampton, near Bladensburg, Maryland, is a distinguished breeder of sheep and stock of all kinds. Two rams, each ten years of age, weighed in the spring, (1809,) 188 and 196 lbs.—one had $10\frac{1}{2}$ lbs. wool, the other $9\frac{1}{2}$ lbs. both unwashed. They were from the Helder. A ram lamb, part Helder and part South Down, weighed 119 lbs. the day he was four months old. One ewe of the same class, gave 12 lbs. of wool. Two rams, pure Helders, and seven ewes of the mixed breed, averaged 9 lbs. of wool: all the above unwashed*.

Weight of fleeces and length of wool of eight ewes of the flock of Col. Tayloe, Mount Airy, Caroline county, Virginia, 1808.

No. 1. wt. of fleece 6 3-4 lbs. Length of wool 6 inches.

— 2.	-	-	7 3-4	—	-	-	9	—
— 3.	-	-	5 1-4	—	-	-	8	—
— 4.	-	-	8 3-4	—	-	-	10	—
— 5.	-	-	7 1-2	—	-	-	8	—
— 6.	-	-	7	—	-	-	8	—
— 7.	-	-	8 3-4	—	-	-	9	—
— 8.	-	-	8 3-4	—	-	-	10	—

62 1-2 lbs.

* Letter to the Editor.

Gross weight of lamb No. 8, after shearing	93	lbs.
Fleeces of sixteen old sheep weighed	63	—
Do. of eight lambs	60 1-2	—
	<hr/>	
	123 1-2	lbs.

Average 5lbs. and upwards.

A shearing of seven ewes, took place at Rose Mount, the residence of Doctor Kent, in Prince George's county, Maryland, on the 25th of May, 1809, the following was the result.

No. 1. 3 years old, yielded	7 1-4	lbs.
— 2. 3 do. do.	6 1-4	—
— 3. 1 do. do.	8	—
— 4 and 5. twins, 1 year old,	6 1-4	— each.
— 6. same age,	6 1-4	—
— 7. do.	6 1-4	—

Average weight of wool yielded by three years old, $6\frac{3}{4}$ lbs. of the yearlings, $6\frac{3}{4}$ lbs. The wool was clean and of a good quality. The lambs are the cross of the Calvert county and Dorsey sheep, and make good mutton. They are easy feeders, not remarkable for size, but well formed and keep their wool clean.

In a part of the country where the sheep do not commonly yield more than half the average weight, the above may be considered as respectable proof of care and attention in selecting, and of good keep. The same gentleman sheared 11 lbs. from a yearling—a cross with a Barbary broad tailed ram.

May 29, 1809.—R. Smith, of Upper Freehold, Monmouth county, New-Jersey, sheared from eleven yearling ewes, $81\frac{1}{4}$ lbs. washed wool, which is more than 7 lbs. 6 oz. per sheep—weight of three previous to shearing, but after being washed and dried, 109 lbs. 98 lbs. 111 lbs.

Produce of yearling Helder ewes imported by D. Clarkson, of New-York, and a full blood New Leicester ram of Capt. Farmer, of New-Brunswick :

1. Ram, weight on foot, 12th of May, 1809, $175\frac{3}{4}$ lbs washed—of fleece on 18th of May, $8\frac{1}{2}$ lbs.—of carcase after shearing 163 lbs.—loss $4\frac{1}{2}$ lbs.

2. Ewe, weight on foot 12th of May, 128 lbs.—of fleece on 18th May, $10\frac{1}{4}$ lbs.—of carcase after shearing, 116 lbs.—loss $1\frac{3}{4}$ lbs. The above was sold to Major Johnson, Salem, New-Jersey.

3. Sir John, yearling ram, clean washed, and dry, on foot, $175\frac{3}{4}$ lbs.—weight of fleece, 11 lbs.

4. Doctor, clean washed, and dry, on foot, $141\frac{3}{4}$ lbs.—weight of fleece, $8\frac{3}{4}$ lbs.

June 2, 1810.—A yearling ram, belonging to B. B. Cooper, of Gloucester county, New-Jersey, the produce of a cross between a Helder imported ewe of Mr. Clarkson's, and Farmer's New-Leicester ram.

Weight of wool,	-	-	-	8 lbs. 11 oz.
Weight of carcase,	-	-	-	135 „ 5 „

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A yearling ewe, of the Persian stock of Mount Vernon, and Arlington long woolled, sent to me by Mr. Custis, in 1806, sheared the following year, six pounds of washed wool. She was finely formed, her wool eight inches long, and tolerably fine. I sent her in the autumn of 1808 to Mr. Dupont's ram, at Brandywine, and had the misfortune to hear of her death, with her lamb.

These examples will serve to prove the positions laid down above, and are certainly highly encouraging to the American farmer. Numerous other instances have occurred to the author's notice, of fleeces of seven and eight pounds, on American sheep, but it is unnecessary to quote them, as the question must be set at rest by the above statements, respecting the improvement which is in the power of every one to make, by judicious and careful crosses, and by attention to selections from our native breeds.

The ages of sheep are known by their teeth. Lambs come into the world with eight small teeth; when about seventeen months old, two large teeth in the middle of the front of the lower jaw appear in the place of two small ones. In the third year, two more broad teeth, one on each side of the former two, appear. In the fourth year, two more appear, viz. one on each side. In

the fifth year, the two hindmost lamb teeth fall out, and two more broad ones succeed; they are then said to be full mouthed, having acquired eight broad teeth.

CHAPTER II.

MANAGEMENT of a flock.—Age and season of propagation.—Best mode of admitting the ram.—General treatment of ewes.—Food.—Shelter.

FROM the little attention hitherto paid to sheep in most parts of the United States, no regular system has been adopted with respect to the general management of a flock, and in particular to the important points of the proper age at which to make use of the ram, or of permitting the ewes, whether young or old to take the male. All those matters have generally been left to nature, though nothing could be more certain than that she is a very bad guide, and when not controlled, will inevitably do mischief.

In the first place, although an early ram will be able to propagate the ensuing autumn, yet the exertion of his powers should only be permitted in extraordinary cases, such as the wish to possess a particularly fine breed, and even in this case, he ought not to serve more than a dozen ewes, at the interval of three or four days from one another. For general use, the farmer, if he wishes to consult his own interest, must wait until he is at least eighteen months old; but it would be still better to wait until he has attained his full growth, or at least until he is two and a half years old, according to the practice of the French national farm at Rambouillet; the same rule has there been applied to ewes, (by which, and the observance of others to be mentioned hereafter); they have attained to a degree of perfection in the form of carcase, and quantity and quality of fleece, unknown in Spain or any other parts of the world. In England the great improvers never use a ram until he is two years old. By this delay, some little loss of time in the multiplication of a flock will take place, but the delay is of little consequence when compared with the great advantages resulting from it, and of securing a healthy vigorous flock. In

commencing with the costly Merino, the rule is of primary importance, because longevity, health, size, fleece, every thing are connected with it.

In the United States, it is common to permit lambs to take the ram the first autumn following their birth; at that time their constitutions are not fully formed, nor are their organs completely developed; they have not yet attained to their utmost growth, and as all the nourishment the ewe is capable of receiving is requisite for the production of her own vigour, and ultimate size, it cannot be supposed that either will be attained when obliged to part with some of it to her fœtus. The fœtus moreover can only derive from the mother as much nourishment as she can spare from the actual support of her own system, and hence it follows, that by so much will it suffer. Both will therefore feel the effects of this early connexion. The progeny will certainly be of a diminutive size, and the foundation of a puny race be laid, which will greatly diminish the profits of the farmer, whether he depend upon the sale of wool, or of sheep for the market or for breed. Lambs moreover often lose their young in yeanning from absolute inability to expel them*, or from a deficiency of milk. For all these reasons, we ought to restrain the ewes from a connexion before the autumn of the year after they are yeanned, at least.

In the mode of admitting the ram to the ewes, great caution is necessary. If he be turned into a flock he will exhaust himself by repetitions of the act; for ewes do not like cows, immediately reject the male after impregnation, but will admit his embraces during the continuance of the rut. He will besides, reject some and caress others. A much better way, if the ewes exceed fifteen or twenty, is to put a few to him at a time, having previously marked his breast, and between his fore legs with red chalk†: thus it may be known by the stain on the back of the ewes whether he has served them, and the fact being ascertained they should

* Before I was aware that lambs would take the ram, I permitted them to run together, in consequence of which, one required assistance in yeanning.

† The way is to grease the parts, and after scraping the chalk upon them, to rub it in with the hand.

be taken from him. Bakewell's plan was to keep an old ram with the ewes as a teaser, but prevented from exerting his powers, by a cloth sewed round his body: the ewes as they were discovered to be in heat, were brought in succession to his tup ram, which he kept in a pen. In this way a ram may serve seventy or eighty ewes. Whereas, if turned into a flock of that number, he would be exhausted before the end of the season, and might probably die. The flock ought to be in high keep during the rutting season, the ram in particular ought to be full fed*; and besides abundance of grass, should have a gill of indian corn daily. By the lambs coming in succession, an opportunity will be offered of paying greater attention to the ewes and lambs, (whose weakness or indisposition, may require particular care) than if many were lambd at the same time, an event which always happens, when no precautions are taken. The time of admitting the ram, must be regulated by circumstances;—if very early lambs for the market be the object, the ram may be admitted at a more early period, but if only the increase of stock, the nearer they come to grass the better, for no food we can provide, equals that substance in increasing milk, and consequently promoting the growth of lambs. Proceeding upon this principle I make it a rule to have my lambs to drop in March and April. A ewe goes one hundred and fifty days with lamb: by attention to this fact, we may provide against her yeanning should the udder fail to announce the approach of her time. The flock should be driven to a shed open on one side, or into a log house or barn every night, and in the day time in stormy weather, from October to May; and previous to lambing, the ewes should be housed, and at all times well littered with clean straw. Their health is thus promoted, their lives secured from their most inveterate enemies DOGS, and a quantity of the best manure made. Hay may be given them in *upright* racks, from both sides, having a trough below for salt, potatoes, turnips, &c.

* A moveable fold might be used to pen the ram, which should be moved upon fresh rich grass every day. A couple of ewes out of heat may be put in with him to prevent his becoming uneasy from solitude, for sheep love company.

The first visits of the farmer in the morning should be to his flock: the lambs that may have dropped during the night, must be removed for a day or two to an out house, or other inclosure or pen, in order to enable him to know whether the mother reject the lamb, or permit it to suck freely. In the former case, the ewe must be tied by the head, and kept with her lamb in a dark place, and to insure a due supply of nourishment for the first few days, the lamb must be regularly presented three or four times daily to the teats of its mother. It very seldom happens that a ewe will reject a lamb intirely, but should this happen, the lamb must continue confined with its mother and suckled regularly, until taught to drink milk from a bowl or wooden dish; it must then be raised by hand.

“Should any deformed or lame lambs be found in the flock, or should any one be killed by accident, strip off the skin from such lamb, and cover with it either a twin lamb, or the lamb of a young ewe who does not appear to be a good nurse, and shutting up the ewe that has lost her lamb, she will generally take it as her own*.” This expedient which, as Mr. Livingston says, is common in Spain, has been recently adopted by Mr. Du Pont, with success, and the life of more than one valuable Merino saved thereby.

It will amply repay the trouble, if the lambs, of weakly mothers be taught, and it may be easily done, to lick a little Indian meal every day.

As one of the surest means of preserving the health of a flock, of procuring the heaviest fleece which the nature of the breed will admit of, and a uniformity of staple, a due supply of good food at all times is essentially necessary.

The farmer must not expect to find his flock, and particularly his lambs improve, if they are stinted at any time, and especially in the winter, when the ewes will require a full portion of juicy strengthening food to convert into milk: and to support them under the exhausting effects of suckling. For this purpose pumpkins, potatoes, and turnips should be provided. It will

* Livingston on Sheep, p. 84.

form an easy duty of an evening, for one or two of the family to cut up a sufficient quantity for the succeeding day's demand.— Few farmers sow turnips as a fallow crop in the United States, although they constitute a regular and indispensable item in the rotations of the most improved English husbandry. But there can be no doubt of their utility as a covering crop, and of the advantage which would be found from the adoption of the practice. Of late it has been more than once recommended, in our public prints to sow them among Indian corn, and some favourable results have been stated of the practice*; but considering their known attachment to rich ground, I question whether they will succeed in this way, unless the manure has been put upon the corn ground, a practice which is adopted by some of the best farmers in New-Jersey. I tried them four years since, in a land which brought me good corn, but without success. The hay I constantly reserve for them is the fine soft natural green grass, (*Poa viridis*) cut before the seeds ripen, which I find they prefer to clover, and which is also preferable because it does not crumble, and thus injure the wool, like the latter, when it happens to fall on the sheep.

Besides the articles just mentioned, I have used with advantage, flaxseed jelly, mixed with the blossoms and leaves of clover collected from the horse mangers or entries of the barn, and by way of change with wheat bran. This jelly is easily made, by means of a boiler fixed in the top of the close stove which warms the farm kitchen. I tried oats softened by hot water, which water also was given to them by way of drink, but I discontinued it after two weeks; as the bellies of the ewes appeared to be drawn up, and I thought from the more frequent sucking of the lambs, that the milk was diminished; a relaxing diet is certainly more favourable to the production of milk. Where oil cake can be procured, a pound or two of it in powder, mixed with a proper proportion of bran and water, and given once a week, will be found highly useful in strengthening the ewes, and in pro-

* I have regularly put in from one to two acres, which have afforded me a profusion for all kinds of stock, and abundant supply for my ewes and other sheep, until grass. They were drawn and preserved in dirt pyes.

moting a flow of milk. About nine or ten o'clock in dry weather, all the flock except the ewes recently yeaned, should be turned out in a field where they can obtain water, or they should be driven to a stream. Even when snow covers the ground, they must be turned out, for two or three hours for exercise, and to air their pens: they will greedily eat the snow, which will supply the place of water. In such weather I have adopted with advantage, the Swedish practice of giving them occasionally, cuttings of cedar, pine, and other resinous trees. Hay or corn blades may be given in the middle of the day, in the field without danger of being soiled or wasted, in trumbrils or circular cages, made of willows*, which are easily removed to a fresh spot. Taking the hint from my Spanish sheep, I have always followed the practice of docking the tails of my lambs, to prevent the accumulation of filth, which will fatigue them to carry, and according to the late experienced Mr. Capner sometimes cause the dislocation of their back bones†. For the same reasons, it is indispensably necessary to trim the tails and upper parts of the thighs behind, before turning out to grass.

In the spring of the year, before grass springs, it would conduce greatly to the health of both the mother and lamb, to turn them every day for an hour into a patch of rye sown for the purpose early in the preceding autumn. Besides the good effects resulting from it as a change of food, the succulency of the rye will promote a flow of milk, an object which should constantly be before the eye of every farmer. When all the crop is consumed, the field, which will be much enriched, may then be profitably cultivated in any way most desirable. Every American farmer knows the benefit of salt to cattle, and will not forget to give it

* A trumbril may be ten feet in circumference, and closely wattled to the height of one foot, above which it is left open for the space of eighteen inches; when it is again wattled to the height of eight or nine inches; an opening is left at top, for the purpose of putting in food. The staves which form the skeleton of the machine, are ten inches apart, so that twelve sheep may feed at each trumbril. A cut of it is given in the Domestic Encyclopædia.

† See Memoirs Agricultural Society of Philadelphia, vol. 1.

occasionally to his sheep. The attentive farmer will of course at any early period mark his ewes and their progeny, so that he may know the relationship between them, and the degree of blood derived from his ram; he will castrate within two weeks all such ram lambs as he does not wish to preserve as breeders for himself, or for sale: he will turn off all ewes in a declining state, or those of inferior breeds, that missed taking the ram; and will wean the lambs at a period sufficiently early to enable the mother to recruit her strength from the exhausting effects of suckling; and secure an abundant supply of pasture for them on the approach, and during the continuance of the season of heat. He will separate the wethers from the ewes, to prevent the latter from being driven away from food: and daily inspect his flock to watch the approach of disease, apply without delay the proper remedy, and separate the sickly, or diseased in any way, from the well. Suckling ewes in particular require the most minute attention. Their udders often swell and inflame, especially in the event of the death of a twin lamb; the side of the udder which the deceased lamb had sucked will then become hard and painful, and sometimes cause a fever, and even the death of the animal. I have to regret the loss of a ewe and also a fine ewe-lamb from such an event; all attempts at raising the latter by hand proved ineffectual. In such cases the udder should be bathed with warm water and soap, three or four times a day, and *stramonium** ointment applied morning and evening to the whole surface, and gently rubbed in.

CHAPTER III.

TIMES of shearing different in sheep, necessity of attention to the point.—Washing, caution requisite.—Improved mode.—Separation of wool of different age and sexes necessary.—Utility of salving sheep.

NATURE points out the most proper time for shearing, by the protusion of the old fleece, and the growth of the new wool un-

* Jimson or James-Town Weed. The ointment is made by bruising the leaves, and simmering them gently over the fire, with hog's fat.

derneath, the line of demarkation being very visible. As this separation, however, takes place in the individuals of every flock, except those of the Merino breed, at various times, from the influence of causes operating upon the animal, and even before the warmth of the weather would seem to make it advisable to relieve them from their fleeces; it is necessary to examine the flock every week after the first of March, and to shear such as begin to shed their coats: otherwise the old fleece will be matted or cotted, and cause much difficulty in picking and carding; and the length of the young wool will be shortened by the delay. It will be necessary to house such for a few days after shearing, to prevent the chance of taking cold; and even for sometime after they ought to be sheltered every night, and also in the day time in stormy weather. With this little care, no danger will attend an early shearing, as I know by my own experience, having been obliged to relieve several American and Dishley ewes from their fleeces some weeks before my general shearing, without any injury ensuing to their health. Previously to shearing it is common to wash sheep in a river, or creek, as it lessens the trouble of the operation, and prevents the necessity of so frequently sharpening the shears, as is required when the dust is left in the wool. This business is too often a cause of frolic upon a farm; and as in such cases, care is laid aside, some remarks are necessary to prevent accidents even when most tenderly performed. Washing is a fatiguing operation, water being an unnatural element to sheep; but when they are roughly handled, it is painful and a source of danger, especially to weakly sheep, or to ewes that lamb late, and that may not have yeaned at the time. I have known an old ewe, feeble, but without particular disease, and having a fine lamb, expire after coming out of the water, in consequence of long and rough handling, and two or three submersions of the head. *Upon this and all other occasions*, farm servants should be cautioned against seizing the sheep by the wool of any part of the body. I have known a handful of wool, in the spring of the year, left with a rough fellow, who seized a strong sheep by the back. They may be caught with the right hand by the hind leg, above the hough, but not drawn back-

wards ; the left hand then being passed under the throat, the right hand is to be placed behind the tail to push the sheep along.

A stream with a clean bottom is generally chosen ; but the tail of a mill race is much preferable, for the animal may be kept free from fatigue, in one place, by two men, while clean water is continually passing through the fleece, carrying with it every particle of dirt. The fleece should be pressed and squeezed to loosen the dirt while the sheep is in the water, and also after they come out, to expedite the drying of the wool ; they may then be driven home in the evening, or early in the morning, to avoid dust, and turned to pasture.

When properly performed, shearing is a neat operation ; and after the fleece is taken off and spread out, every part of the animal may be accurately designated. Great improvements have of late years been made in England, in the process of shearing, by clipping round the animal instead of lengthways. The present method, according to Cully, is as follows :—"Begin at the back of the head, in order to give room for the shears to make their way down the right side of the neck to the open of the breast. The man then sets down upon his right knee, laying the head of the sheep on his left knee, bent, and beginning at the breast, clips the under side of the throat upwards to the left cheek, then takes off the back of the neck, and all the way down below the left shoulder ; he then changes to the contrary side, and makes his way down to the open of the right flank,—this done, he returns to the breast, and takes off the belly, after which it matters not which side he clips, because being able to clip with either hand, he meets his shear points exactly at the middle of the back, all the way, until he arrive at the thighs and legs : he then places the sheep on its left side, and putting his right foot over the neck, and the other forward to the undermost hind leg, clears the right side : then turning the sheep over finishes the whole."

Mr. Price (*Annals of Agric.*) describes the process thus :—"It commences with the shears at the crown of the sheep's head, with a straight cut along to the loins, returning to the shoulder, and making a circular shear around the off side to the middle of the belly : the off hind leg next ; then the left hand holding the tail, a cir-

cular shear of the rump to the near huck of the sheep's hind leg : the two fore-feet are next taken in the left hand, the sheep raised, and the shears set in at the breast, when the remaining part of the belly is sheared round to the near stifle : lastly, the operator kneeling down on his right knee, and the sheep's neck being laid over his left thigh, he shears along the remaining side."

Young shearers are obliged to have the legs of their sheep tied, and to place the animal upon a table, or board raised from the ground. But expert operators require no ligature, nor do they raise the sheep from the ground or floor. My flock were in this way shorn last year by an Englishman, who gave me great satisfaction. About one dozen sheep at a time were driven into a moveable fold under a tree, while the rest were grazing in the adjacent orchard : a boy cut off the tag-locks, and handed the sheep as wanted. He performed upon the American and Dishley ewes with expedition ; that is, turning off twenty-five per day ; but when he began with the Merinos, he immediately perceived the difference, the shears entering with difficulty the closely matted fleeces, and I was obliged to restrain his eagerness to finish the task, from a fear that he would wound some of them with the shears, an accident which in fact happened, in two or three instances. A shady pasture should be provided for the flock after shearing.

The wool of rams, wethers, ewes, and yearlings, should all be kept in separate parcels ; and to prevent mistakes, a ticket or a small tally, with an appropriate mark to designate each sort, may be attached to the fleeces. In the case of Merinos, the degree of blood of each fleece must also be attended to, and noted for the benefit of ourselves or of the manufacturer ; for the wools of different ages and sexes have different capacities of fulling, and in order to insure a uniform piece of cloth, wool of the same denomination in all respects must be used. The fleece when taken off must be wound up with a band, made from the wool of the hind part, gently pulled and twisted.

The practice of anointing sheep with mineral and unctuous substances, after shearing, is of high antiquity, being recommended by Virgil (Geo. lib. 3.). The object in those days was merely to cure diseases of the skin. But greasing wool has been found

in certain situations, and in certain breeds, to produce excellent effects; the practice therefore deserves attention from those who are anxious to improve. Thus, where sheep from their numbers, or want of conveniencies, cannot be housed in winter, a mixture of tar and butter applied in the autumn to the skin, resists the injurious effects of cold rains, kills ticks, (*hippobasca ovina*) prevents or cures the scab, promotes the growth, and softens and refines the staple of the wool. The usual proportions in England are sixteen pounds of butter (hogs fat would probably answer) to one gallon of tar. The butter is first to be melted, the tar added, and the mixture stirred with a stick, until the two substances are well incorporated, and form a soft tenacious ointment. The mode of applying it, is to divide the staples with one hand, and apply the ointment to the skin with the finger of the other hand; in this way the ointment is kept constantly soft by the warmth of the skin, and is equally diffused through the fleece. The above quantity will suffice for fifty sheep. The only objection to salving is the stain left by the tar on the wool, which is so difficult to be extracted in scouring, that it is rendered unsuitable for bright dyes or white goods, and hence Mr. Bakewell, a professed wool stapler, who warmly espouses the practice, proposes the substitution of bees wax, and if any tar be used, advises no greater proportion than one quart to ten pounds of the mixture: to obtain all the advantage of the unguent, both to the wool and sheep, it should be applied immediately after shearing, and again at the approach of winter. By the first grease, the wool will be covered and defended from the injurious effects of the action of the soil, and it will be kept soft and moist during the parching heats of July and August. The upper part of the staple, moreover, will not be harsh and dry, as is the case with ungreased wool, and which is commonly cut off and thrown away. The second application may be in November, when the ointment must be laid close to the skin in regular lines, and well rubbed in. A confidential person ought to be employed on this occasion. If wax be not at hand, and tar objected to, turpentine might probably be used with success. This ointment is a substitute for the natural yolk of sheep, with which our native American sheep are

very deficient, and is particularly necessary to be applied in the southern states, to counteract the injurious effects of a vertical sun, especially after shearing, upon the fleece. Merino wool abounds so much with yolk, that the second application of the unguent may not be necessary, but some unctuous substance ought certainly to be applied after shearing, to prevent the injurious effects of the sun, on the young wool.

CHAPTER IV.

OBSERVATIONS ON Merino sheep.—Origin involved in obscurity.—Various opinions.—Probable one given.—Forms of various flocks.—Divisions of wool.

THE origin of the Merino race of sheep is involved in much obscurity. Lasteyrie says, the word Merino, according to a Spanish writer, is derived from *Marinos*, because the breed came from beyond sea. It is probable therefore, that it is not a native of Spain. The English have long contended for the honour of either having originated the breed, or of greatly improving it by the admixture of the Cotswold breed: but Doctor Parry, after a very laborious, ingenious and learned investigation* of the subject, declares, that the notion, however flattering to national pride, falls to the ground as soon as it is coolly and deliberately investigated.

The French† assert, that this race was formed about the time of the emperor Claudius, from a cross between fine woolled African rams imported by Columella, uncle of the agricultural writer of that name, with common ewes; and that after having been lost for thirteen ages, Don Pedro, of Castile, in 1350, renewed the experiment by importing Barbary rams and ewes, a measure which was followed up by cardinal Ximenes, in the beginning of the sixteenth century. Doctor Parry however, plainly shews, by the original quotation from Columella, that his meaning was misrepresented by the French writer: for “the Barbary rams had coloured coarse wool, and the Tarentine ewes to which he put them, were celebrated for their fine fleeces:” so that if any change did take

* These epithets are not wantonly bestowed, but justly merited: it is rare to see any obscure fact investigated with more ability than the notion of the origin of the Merino race in England, by Doctor Parry.

† Folio Encyclopædia.

place it must have been derived from the mothers ; and further, " that no Don Pedro the fourth, king of Castile, ever existed : and lastly, that all historians are silent on any importation of sheep from Barbary by cardinal Ximenes, who himself asserts, that in the attack, by him, in 1509, upon the Moorish city of Oran, he gained no personal emolument, except a few Arabian manuscripts, and some other curiosities." The statement by the French Encyclopædists has been unfortunately copied by many subsequent writers. But the above facts resulting from the original quotation of the passage referred to in Columella, show its incorrectness.

From several coincidences of practice, suggested by similarity of circumstances, and from several important particulars, as of form, fleece, constitution, general treatment, &c. in which they agree, and which are detailed with great accuracy, Dr. Parry is induced to believe that the present Merinos are the same as the ancient Tarentine sheep of Apulia. The determination of the question may not be attended with any practical utility, but this concise abridgment of the various opinions on the subject was thought worthy of a place, and it is hoped will not be found devoid of interest.

The common form of this race in Spain, is not a model of symmetry or of just proportion ; being often high on the legs, with large heads and long necks, narrow chests and somewhat flat sided. They are in general also below the common size of sheep : in these respects a great difference is observable in the same flock, and in the different flocks bearing the name Merino, in Spain.— They are capable of great improvement, and the effect of attention to this object is evident from the plate prefixed to this work ; and from those which have been bred in the United States. The skin is soft, thin, and loose, qualities well known to be connected with a disposition in other animals to speedy fattening. It is also of a rosy hue, or carnation colour. This tint is particularly conspicuous in the eye-lids and eyes. More parts of their bodies are covered with wool than any other breed of sheep ; it exists on their foreheads approaching the eyes, on the cheeks, on their bellies, on their hind

legs, and sometimes their fore legs, down to their hoofs*. The rams generally have large spiral horns, the ewes of the full blood are hornless or polled; but the half, three quarter, and seven-eighth bloods frequently have horns.

The length of the staple is from two to somewhat more than three inches; and in the best breeds is much alike on the shoulders and on the thighs. The wool of the ram is generally esteemed the coarsest and longest; that of the ewe finer and shorter, and that of the wether, in both respects between the two former. The common produce of unwashed wool in Spain is 5 lbs.; the fleece should be free from white coarse hairs, called by the French jarr, and by the English kemps, stichel hairs, or cat's hairs. Those which here and there occur among the Merino wool, are very short, and easily drop out during the process of manufacture, so as not to injure the fabric.

There are a great number of Merino flocks belonging to different proprietors, who are chiefly grandees, or societies of monks; and, as just observed, differ in form, size, and in weight and fineness of fleece. A few shall be mentioned.

Monastery of Paular,
Escorial, or Patrimonio,
Guadeloupe,
Negrette, or Campo Alange,
Muro,
Infantado,
Leon.

Lasteyrie says, that it was from the Negrette stock that those came, which were presented to the king of England by the king of Spain, in 1791; they possess the largest carcasses, the heaviest fleeces, and the finest pile of any of the breed, and together with the piles of Paular, Negrette and Escorial are retained for the royal cloth manufactory at Guadalaxara. Burgoanne confirms

* This peculiarity is so common, that unless a sheep, called Merino, is thus clothed in wool, a suspicion is entertained among us, of a deception. This only shews how liable we are to commit mistakes. A late imported ram, now in the possession of J. A. Smith, Esq. of Black-Point, New-Jersey, has no wool on his legs, and yet a manufacturer has offered 2 dolls. 67 cts. per lb. for his wool. Don Pedro has also, very little wool on his legs.

this statement. The flock of Guadeloupe are the best proportioned, and are equal to any in the weight and fineness of fleece.

The wool of the Merino lamb in general is evidently coarser and harder than that of the sheep. Different flocks vary in this respect. The lambs of the Infantado, Paular and Negrette race, are covered with a coarse sort of hair which changes into very fine wool. The old sheep keep their teeth longer than other breeds; even to the ages of 14, 15, 16 years, according to the statement of Mr. Pictet of Geneva; and several instances are mentioned of ewes of the above ages, bringing forth lambs.

The wool is divided by the Spaniards into four parts:—The first, which is called *Refina*, and by the French, *Laine-Mere*, is taken from the flanks, as far back as the tail, the shoulders and sides of the neck. The second, or *Fina*, comprizes the wool of the top of the neck, the haunches as far as the line of the belly, and the belly itself. The third, or *Tercera*, is that of the jaws, the throat, the breast, the fore thighs to the knees, and the hinder thighs to the line of the belly down to the hocks. The fourth, or *Cahidas*, is that below the hocks, between the thighs, the tail, the buttocks, the pole and behind the ears, and all that which shakes out of the fleece in shearing, or in washing. In the cut annexed, from Lasteyrie, the parts of the sheep which furnish the wool of these respective qualities, are included within the corresponding lines, and indicated by the figures 1, 2, 3, 4.



CHAPTER V.

WEIGHTS of fleece.—Live weights.—Loss of wool in scouring.—Proportion of cloth to wool.—Mode of improving quality of wool.—Mode of counting degrees of blood of a ram.—Washing Spanish sheep improper.—Mode of washing wool.

THE weights of fleece in the Merino breed are various. This diversity is owing to the sizes of the animals, and the regular keep, winter and summer. In Spain, according to Lasteyrie, and as already noted, they average 5 lbs. In Mr. Tollet's flock, in 1804, the average weight of each fleece in the yolk was 6 lbs. 6 oz. The yearlings, 4 lbs. 5½ oz. each. The lightest ewe fleece weighed 3 lbs. 4 oz., and the heaviest ram fleece, 11 lbs. 12 oz., at thirteen months old. He was laid at 20 lbs. the quarter. The fleeces of the rams weighed generally 8 lbs. 2 oz. That of Mr. Livingston's full blooded ram, Rambouillet, imported from France, weighed 9 lbs. Clermont, fourteen months old, (1809), 9 lbs. 6 oz. Columbus, and Hornless, 6 lbs. 7 oz. The latter three were yeaned in the United States; his ewes from 4 to 5 lbs. Mr. James Caldwell's ram Columbus, two years old, from a ram of Mr. Müller's, and a ewe of Col. Humphreys' sheared the present season, 9 lbs. unwashed wool. A ewe, same cross, 6½ lbs. Another ewe of Humphreys' stock, 5¼ lbs., all unwashed, but wool clean, the sheep having been kept on grass ground. Mr. B. Cooper's Spaniola, seventeen months old, from Mr. Caldwell's stock, sheared (1810), 12 lbs. Dr. Parry says, he has known the fleece of the same ram vary in two years, from 7 lbs. 9 oz., to 5½ lbs. This especially takes place after the teeth are so much injured by age, as to prevent the animal from feeding; for it is universally found that the quantity of wool is, within certain limits dependant on a sufficient quantity of wholesome nourishment. This however was not the case with the ram mentioned. The weight of fleece may be naturally expected to increase till the animal has reached his full size: which is not before he has six teeth, or between three and four years old: and it certainly diminishes as he grows old. To this cause must be attributed the decrease of the weight of the fleece just noted. Ten rams of different ages, from four teeth up-

wards, sold to Mr. Birkbeck, by Dr. Parry, gave 97 lbs., or nearly $9\frac{1}{4}$ lbs. each. Two gave 11 lbs. 15 oz. each, and one, (the finest) 12 lbs. A ram of Mr. Pictet, of Geneva, weighed 12 lbs. $13\frac{3}{4}$ oz. The ewes of the same gentleman, averaged 6 lbs. $8\frac{1}{2}$ oz. The two-tooths, give more than 9 lbs. 13 oz. of unwashed wool. One of his rams, of the same age, gave a fleece weighing 14 lbs. 13 oz.* Of the flock at the national farm, at Rambouillet, in 1797, the average weight of the fleeces in yolk was 7 lbs. $8\frac{1}{2}$ oz. In 1802, the fleeces of the adult ewes averaged 9 lbs. 13 oz. Of the rams of three or four years old, 11 lbs. $5\frac{1}{4}$ oz. each. The weight of some of the rams was nearly 8 kilogrammes, or 18 lbs. $5\frac{1}{2}$ oz. each, unwashed.†

The live weights of the Merino race, differ as much as their fleeces. They are alike influenced by the same causes. No one who keeps his flocks upon half allowance, can expect, with the least reason, that either fleece or carcase will arrive to their ultimate weights. A difference however, will be in part occasioned by the nature of the original stock from which the ram came, but more upon the size of the ewes selected to breed from, and whose influence is too commonly overlooked by those who have attempted to improve. In the case of the Merino it has been accurately ascertained, that it is from the sire, an amelioration of the fleece is to be expected, and by the mother that the form is enlarged or changed. From an early conviction of this point, and an anxiety to unite beauty of form with fineness of fleece, I have ever made the selection of ewes a chief object, and have taken the pains to bring Dishley ewes from New-Brunswick, New-Jersey, to cross with Merino rams, the beauty of their forms being unquestionable. The result has answered my expectations. In like manner, Mr. Livingston, by attention to this circumstance has greatly improved his Merino flock in size and beauty.§ “I had, says Dr. Parry, a strong confirmation of this last year, when the lambs got by my finest woolled ram, which was not well shaped, and smaller

* Pictet Faits et Obs. sur les Merinos.

† Lasteyrie, Histoire de l'introduction des Moutons a laine fine, D'Espagne, &c. p. 56.

‡ Comm. to board Agric. vol. 5, p. 557. § On sheep, p. 121.

than most of the other males, turned out to be larger and better formed than the generality of my other stock. The same thing happens in other animals."*

Mr. Livingston's ram	Rambouillet,	}	wt.
	(1809),		140 lbs.
"	"	Do.	(1810) 155 — with his fleece.
"	"	Clermont,	(1809) 126 —
"	"	Columbus,	" 123 —
"	"	Hornless,	" 122 —
Mr. Caldwell's ram	Columbus,		145 — sheared,
"	"	" $\frac{1}{2}$ blood 5 m. old,	}
		(July 1810),	

Mr. Cooper's Spaniola, " 112 — washed.

Of my own flock I shall speak presently.

As it may be useful and at least satisfactory to the American clothiers, to know the amount which Spanish wool loses after washing, the following statements are given.

1. King of Englands flock ;—100 ewes and wethers—9th of June, 1800.

Wool washed on the sheep's back,	398 lbs.
Loss in scouring, - - -	104 —
Amount of scoured wool, - -	294 —

Which produced when sorted

Prime, or Refina, - - -	234 —
Choice, or Fina, - - -	34 —
Fribbs, or Tercera, - - -	26 —

2. Same flock, 1801—108 ewes and wethers.

Wool washed on the sheep's back,	397 —
Loss in scouring, - - -	112 —
Amount of scoured wool, - -	285 —

Which produced when sorted,

Prime, or Refina, - - -	237 —
Choice, or Fina, - - -	31 —
Fribbs, or Tercera, - - -	17 —

The wool of the rams and fatting wethers which had been kept separate.

* This subject shall be more fully explained in a future number.

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Amount of scoured wool, - -	285 —

Which produced when sorted,

Prime, or Refina, - - -	237 —
Choice, or Fina, - - -	31 —
Fribbs, or Tercera, - - -	17 —

The wool of the rams and fatting wethers which had been kept separate.

* This subject shall be more fully explained in a future number.

Wool on the sheep's back, - - -	220 lbs.
Loss in scouring, - - -	82 —
Amount of scoured wool, - - -	138 —
Which produced when sorted,	
Prime, or Refina, - - -	96 —
Choice, or Fina, - - -	30 —
Fribbs, or Tercera, - - -	12 —
The pelt wool of 11 fat wethers, sold in Newgate market, was taken off, and weighed in the yolk :	
Amount of wool, - - -	36 —
Loss in scouring, - - -	8 —
Amount of scoured wool - - -	28 —
Same flock, (1802), 96 ewes.	
Shorn, - - -	352 —
Loss in scouring, - - -	96 —
Amount of scoured wool, - - -	256 —
Which when assorted produced,	
Prime, or Refina, - - -	221 —
Choice, or Fina, - - -	32 —
Fribbs, or Tercera, - - -	3 —*

The wool of the Rambouillet flock wastes more than two-thirds in scouring : lord Sommerville's, one-half : in Spain, two-thirds : 356½ lbs. of Mr. Tollet's flock, were reduced by washing, to 184 lbs., and when purified by clean scouring, this wool, like best Spanish would be reduced to 152 lbs.

Thirty-six and an half pounds of Refina in the yolk, became, when picked and dyed blue, 48 lbs.—76¾ Refina in the yolk, were reduced to 44½ lbs. when dyed blue, or about 43¼ lbs. undyed.† 32¾ lbs. of the same wool became, when picked and scoured, 19 lbs.

From the above, and various other statements, it appears that the Refina wool wastes considerably less than half. Fina, and inferior sorts, about half. Upon the whole, Dr. Parry concludes, that, "if a Merino, Ryeland flock, of the finest wool, be carefully attended to in feeding, shearing, and if the operation of scouring and picking be skilfully and faithfully conducted, the total re-

* Reports of the state of His Britannic Majesty's Spanish flock, by Sir Joseph Banks, for 1800, 1, 2. † Dr. Parry.

duction cannot amount to half the original weight of the gross wool in the yolk.*

As to the extent of the wool the produce of a Spanish ram, and Ryeland ewes, Dr. Parry gives the following facts :—

Forty-six pounds and three quarters made $29\frac{1}{4}$ yards of cloth. — $46\frac{1}{4}$ lbs., $30\frac{1}{4}$ yards.— $44\frac{1}{4}$ lbs., $28\frac{1}{4}$ yards.—42 lbs., $26\frac{3}{4}$ yards. The whole produce $179\frac{1}{4}$ lbs. made $114\frac{1}{2}$ yards. Sixty pounds of Spanish wool, make 30 yards. The same quantity of Doctor Parry's Merino Ryeland wool made $26\frac{3}{4}$ yards, or about one pound nine ounces to the yard. He concludes, that this cross goes farther in the fabric than an equal weight of the best Spanish in the same state, and therefore is, in that respect, more valuable to the manufacturer.† But Mr. Livingston says, that a yard of cloth was made at Clermont, by common country spinners and weavers, from 1 lb. 4 oz. of Clermont Merino wool: and $32\frac{1}{2}$ yards of twenty-five and an half inches wide, were made in Edward P. Livingston's family from $16\frac{3}{4}$ lbs. of wool.‡ These facts are highly flattering to the American improver and the manufacturer: for we must suppose that in proportion to the perfection of our machinery, and of the whole process of the manufacture, the wool will go still farther; and in the case of cloth from ten to fourteen dollars per yard, the difference of half a yard in a piece, is an object well worth attention.

The loss in scouring and picking the wool, will be less in proportion to the cleanliness of the sheep: and hence the greater necessity for attention to that point.

The only mode to improve wool to a desired degree of fineness, is to put such rams to the ewes as possess that quality of wool which we wish to transfer to our flocks. The finer the wool of the rams are, and the more perfect their shapes, the sooner will the object of the breeder be obtained; for although the form of a breed depends greatly in all cases upon the female, yet both parents have an influence, and therefore their forms should be attended to.

* Seventy-two pounds of selected lambs wool, by scouring and picking was reduced to 42 lbs., and made 28 1-2 yards blue broadcloth, dyed in wool. p. 459.

† Comm. Board Agric. vol. 5, part 2d. p. 449.

‡ Comm. &c.

p. 452.

The following is the rule for determining the proportion of blood infused into a flock by a ram.

Suppose the ram, the fineness of whose wool we wish to incorporate with our flocks, to be designated by the figure 1, and the ewe by 0,—the lamb will of course partake of one half the qualities of the sire, and one half of those of the dam: the lamb consequently will be related to its sire as $1+0=\frac{1}{2}$, that is to say, it will share in one half of the qualities of the sire.

In the second cross, the ram will still remain 1, the lamb produced from the first generation will remain in its qualities half: it follows that the lamb produced from $1+\frac{1}{2}$ will be equal to three quarters of the qualities of the sire.

In the third generation, the ram will still remain 1, and the ewe to be crossed remain three fourths, the offspring of this couple will possess seven-eighths of the qualities of the sire.

Finally, in the fourth generation, the ram will still be 1, and the ewe to be put to the ram be seven-eighths, it follows that the lamb from the fourth generation will partake fifteen-sixteenths of the qualities of its sire, and if the ewes have been well selected in the first cross, the difference between the ram and his progeny, will be scarcely if at all perceptible.

The following is another view of the subject:

Suppose common sheep to stand to the Spanish breed as 0 to 1, and the experiment to begin in 1810, the progeny will then not arrive at full proof until the spring, 1817. The produce is supposed to be ewes, and not to be put to the ram until the second autumn after their birth, say seventeen to twenty months old, or having two large teeth.

0	Common breed,	}	October, 1810.
1	Spanish ram,		

$\frac{1}{2}$ Or first cross, March, 1811.

.....

$\frac{1}{2}$	Breeding ewes, 1st cross	}	October, 1812.
1	Spanish ram,		

$1\frac{1}{2}$

$\frac{3}{4}$ Second cross, March 1813.

$\frac{2}{4}$ Second cross, }
 1 Spanish ram, } October, 1814.

$1 \frac{3}{4}$ —
 $\frac{7}{8}$ Third cross, March, 1815.

.....

$\frac{7}{8}$ Third cross, }
 1 Spanish ram, } October, 1816.

$1 \frac{7}{8}$ —
 $\frac{15}{16}$ Fourth cross, equal to full blood, March, 1817.

At present, full blooded rams are not within the power of every one, and therefore many are obliged to begin the improvement by half, three-quarter, or seven-eighth rams. This is proper, because, it cannot but follow, that the produce of such rams will be an improvement upon a flock, proportioned to the quality of the ram, and the fineness of the ewes put to him. In this case, ewes should be selected with more care and attention to wool, than if a full blood were in our power, because less improvement is to be expected; and therefore advantage should be taken of the little which the ewes will impart to their progeny. The same ram, however, ought not to be put to any of his progeny, with a view to improvement, but new ewes be chosen; nor ought a ewe used for the first cross, be put to a ram from the same cross, because it will be putting 0 to $\frac{1}{4}$, and the lamb produced by this couple will only have a quarter the fineness of the sire's wool. If, moreover, a ram of this cross, say one fourth, is put to a common ewe, equal to 0, the lamb will inherit of its original sire's qualities, no more than one-eighth. Thus, the line drawn between the sorts, to which the ram and ewe belong, becomes gradually more prominent, and the two breeds which were intended to be mixed together in their properties, begin to separate and to return to their former state. Where, however, rams and ewes of the same cross couple, the improvement will only stop, and if attention be paid to the preservation of the health of the animal, and to the keeping up a supply of good food, no diminution in its quality will take place, an event which every one will naturally wish to avoid.

Dr. Parry objects to washing the wool on the sheep's back. The fleece he remarks, is so thick, that when soaked in the water,

it is very long in drying, and if the weather prove wet and cold, the sheep is incommoded. The wool, he remarks also, in full yolk, might be kept longer without danger from the moth. Both these reasons are of considerable weight; but two other powerful ones against washing it on the sheep's back, are, the impossibility of fully cleansing it of the yolk, and the probable injury which the wool would in consequence sustain. The difference of trouble to the shearer, between unwashed and washed Merino wool, is but trifling. Mr. Livingston, moreover informs me, that he is now convinced from several trials, the finest thread may be made of unwashed wool, as hinted in his useful book (p. 155), and recommends not to wash it before being carded and spun. The wool must however be carefully picked, and freed from all hay seeds, dirt and motes, and opened perfectly before it is carded.

In confirmation of Mr. Livingston's opinion, as to the advantage of spinning Merino wool in its natural grease or yolk, without washing, I may mention the following fact from Mr. Roard, Director of the French national dyeing establishment.* "On comparing wool spun in the grease and afterwards scoured, with that scoured before it was spun, it appeared that the former had become exceedingly white, resembling the colour of unwrought cotton, while the latter retained a dull yellow cast, from which it can never be freed. This last experiment frequently repeated, and in several different ways, constantly afforded the same results. It agrees with the ideas current in the work shops, that wool badly scoured, can never be thoroughly cleansed from yolk, and that a great part of the preparations it may receive in dyeing are never fixed in a solid manner."

Where a flock is small, there can be little difficulty in preserving their fleeces so clean as to enable a spinner to card and spin the wool without washing; but in large flocks, the fleeces will acquire so much dirt in the course of a year, as to render it necessary to wash the wool before being made up. For this reason the proper mode of washing shall be given at length, because if done at all, the beauty of a piece of cloth will depend upon the perfection

* *Annals de Chimie*, No. 158.

of the operation. I shall give the French method as translated by Parry, from Gilbert's work on sheep.*

The washing, if possible, ought to be done before the middle of October, as after that period, the water employed in washing, would cool too soon: and the shortness and coldness of the days, would make it difficult to dry the wool. Each sort of wool must be separately submitted to the following operations:

On the evening of the appointed washing day, open the wool carefully, and spread it on hurdles, supported by tressels, beat it gently with two small sticks tied together, shake it well to separate the dust, and particles of hay, straw, &c. If any parts of the fleece are entangled, they are to be opened with the fingers, or with a fork in each hand, having short crooked fingers of metal.

The wool is then to be thrown into one or more tubs, proportioned in size to the quantity which is to be washed. When they are full, the wool may be well pressed or trodden in, and water is to be poured on it, heated to about the 144th degree of Fahrenheit's thermometer, till it reaches the top of the vessel. In this manner the wool must steep for at least eight or ten hours; or it may remain even twenty-four hours, if convenience require it.

The water thus impregnated with yolk is not to be thrown away, but is essential to the operation of washing. When, therefore, the wool is taken out, as much of it as possible should be allowed to drain back into the tub.

One or two boilers, according to the quantity of wool to be washed, are now filled about two-thirds full of this yolk-water; which is gradually warmed till it reaches about 150 or 160 degrees of Fahrenheit. Less than 144 degrees are insufficient, and more than 167 are found to make the wool hard, crisp, and friable. The proper degree of heat is that, which begins to be too great for the hand to bear.

At this heat, a quarter or half of a fleece is thrown in, according to the size of the boiler. The less there is at once, the more

* I had the satisfaction however lately to learn, that the process I have given in the Domestic Encyclopædia, (article wool), translated from the *Leip-sic Magazine*, for washing wool, has been applied with success to the Merino fleece. The process differs in but few essential points from that of Gilbert.

perfect will be the scouring. Then for three or four minutes the wool ought to be moved, by continually lifting it up with a small fork of wood, so as to separate the proportions as much as possible. If it were turned, it would entangle, which would not only prevent it from being thoroughly cleaned, but render it less fit for the subsequent operations which it is to undergo.

The water being now at such a temperature that the hand can bear it, the wool is to be taken out either with the hands or with the fork, and is put into a basket, which is held for a moment over the boiler, in order to save the yolk-water. It is then carried to the water in which it is to be rinsed.

In proportion as the water in the boiler wastes, the loss is repaired by the gradual addition of fresh yolk-water, as every portion of wool is taken out; so that the heat may be kept up to the same uniform standard. When the yolk-water, by successive immersions of new wool, becomes thick and muddy, the boiler is emptied, and the bath is entirely renewed.

The water employed for the purpose of rinsing should be as soft as possible. A clear running stream is, on many accounts, best. The water of wells is the worst; but where no other can be obtained, it may be meliorated by exposure to the air for some days, or even by being previously boiled.

The wool is rinsed in large baskets of open wicker-work, in order that the water, in passing through them, may carry off all the extraneous substances which may have adhered to it. In running water, two such baskets, each of an oblong square form, are fixed near each other, at the bottom of the water, so that the sides of the basket shall be some inches above the surface, in order to prevent the water from carrying away the wool. The wool is washed in the basket which is farthest down the stream, the higher basket being meant to receive it after it has been so washed. Here it is fully purified from every thing which may have escaped the washing immediately preceding.

To the perfection of this last operation, nothing contributes so much as the manner of performing it. The wool must never be rubbed, which would twist, and even felt it. It is sufficient to move it briskly in the running water, and to open it as much as

possible with the two hands; or, if the work be on a large scale, to move the wool constantly from one end of the basket to the other, by means of a rake. When it appears to open well, rises to the surface, and spreads itself there like a sort of cloud, and, at the same time, the water runs transparent out of the basket, the wool is then thrown into the upper basket, where it is allowed to remain for a few minutes, and is then taken out to dry.

When one is forced to wash in stagnant water, it is necessary to line the bottom in such a manner, that the water may not easily become muddy. In this case it is necessary to use a smaller basket, with two lateral handles, by means of which it may be plunged in and out of the water, till it comes out perfectly clean.

Instead of draining the wool, as it is taken out, on an inclined plane of stone, which is the first process of drying practised on a vast scale at the washing places in Spain, Gilbert recommends a method which, he says, he has found much more expeditious, and which is to squeeze out the water by means of a press. According to him the pressure is so far from being injurious to the wool, that it causes it to open the better. It is easy to see what benefit must arise from thus enabling a person to finish the whole operation of drying in one single fine day.* For this purpose, the wool, when taken from the press, must be spread on dry turf, previously cleaned by raking and brushing.

The wool thus washed, being only in the Spanish state, and still containing a portion of the yolk, which consists of fat incapable of being detached by the saponaceous part aided by hot water, farther means will be necessary in order to remove it. To effect this purpose the manufacturers employ urine. According to Vauquelin, fresh urine, which contains uric acid, and therefore decomposes the soap of the yolk, is, on that account, detrimental to this operation; and stale urine, which derives its power merely from a small proportion of ammonia and mild potash, is inadequate to it. Nevertheless, it certainly succeeds in England, according to Dr. Parry, which the manufacturers explain by sup-

* I believe that this method is employed in many of the English manufactories.

posing the urine of beer drinkers is chemically different from that of those who drink weak and ascesent wines. Whether this be true, or whether the difference arise from superior skill in English workmen, he cannot determine. Some persons recommend, for the same purpose, a small quantity of pot-ash or soda; and Vauquelin advises soap, in the proportion of about one-twentieth of the weight of the wool.

CHAPTER VI.

FINE wool, not confined to Spain.—Merinos thrive in various parts of the world.—Climate, exercise, food, have no effect on quality of wool.—Notice of Merinos in the United States.

FOR a long time it was generally believed in Europe, that fine wool could be only raised in Spain. The first nation that proved the absurdity of the prejudice, was Sweden. In 1723, a flock of Merino sheep were introduced into that country, and such was their multiplication, that in 1764, there were 65,369 sheep of the pure breed. This rapid increase was in all probability owing to the bounties given by the government to all venders of fine and good wool. The Danes followed the example of the Swedes, then the elector of Saxony, Piedmont, Prussia, the German princes, and Holland. France was not behind hand, but it was not until the year 1776, that any systematic attention to the improvement of wools, took place. England, a great woollen manufacturing country, and alive to every thing connected with her aggrandisement, strangely overlooked this great source of individual and national wealth; her travellers returned home without noticing the existence of fine woolled sheep in the accounts of their tours, and even when the treasure was forced upon them in 1792, by the extraordinary generosity of the king of Spain, who sent to the king of England, several Merino sheep, no measures were taken to propagate the breed to the extent their necessities required, or the opportunity permitted. They continued to send away millions for fine wool to all parts of Europe, particularly Saxony, without once asking the question—cannot we raise this at home?

At length however, Dr. Parry, of Bath, made the experiment of crossing a Spanish ram, originally presented to the king, and which he obtained the use of, with Ryeland ewes, a hardy fine woolled breed of England. Lord Somerville, Mr. Tollet, and other spirited improvers followed in the train, and notwithstanding the violent opposition raised to their efforts by interested persons,* they soon proved that the opinion of the impossibility of growing wool in England equal to that of Spain was a vulgar error. Unprejudiced manufacturers after having made up broad-cloths, cassimeres, flannels, and other stuffs from the Anglo-Merino wool, pronounced its quality in every respect equal to any imported: and so far from any degeneracy having taken place, where proper care was taken with respect to all the necessary points, that Doctor Parry declares his fourth cross with a Spanish ram, has given him such fine fleeces, that he injured the quality of the fleece of a whole generation by making a fifth cross with an imported ram. With respect to the quantity of the wool, it has been already stated, that it has increased in England.

To put the question of the EXCLUSIVE CAPACITY of Spain to grow superfine wool, to the unerring test of truth, Mr. Lasteyrie, of Paris, undertook the arduous task of making a sheep tour through the continent of Europe, to examine personally into the actual state of the fine woolled flocks. The result of his observations, which he has given in a concise work,† shew that the *fineness and weight of fleece are by no means relative to climate, soil, temperature of air, quantity or quality of food, size or habits of life*; and above all, MUCH EXERCISE is not essential to the production of fine wool. He left them in France, and saw them naturalized in Sweden, Denmark, Germany, Switzerland, Piedmont; to which may be added, the Cape of Good Hope and New-Holland. This immense tract affords a range of latitude from 59° 20' north, to 34° south, and includes countries, some of which

* Many of the manufacturers of woollen cloth in England are concerned in the importation of Spanish wool. They therefore were opposed to the plan of rendering the country independent of a foreign supply.

† Histoire de l'Introduction des Moutons a Laine fine d'Espagne, dans les divers E'tats de l'Europe, et au Cap de Bonne Espérance. Paris, 1802.

are elevated, others low, some dry, others swampy, some open, others woody, some rich, some poor, some hot, others temperate, others intensely cold. In one country, this breed is exposed during the whole year to the external air, and all the vicissitudes of weather, and exercises itself at will. In another, it is constantly housed during the night, and sheltered from every storm; or for six or seven months of winter never uses its limbs, or inhales the open air, except during a part of the middle of a very fine day. Even in Spain itself, so far from the constant change of climate, upon which so much is supposed to depend, being necessary for the preservation of the fine quality of wool, he found that many of the finest of the Merino breed *never* travel.*

The food of the Merinos is not less diversified than their climates and treatment. In some countries they feed on grass through the whole year. In others, hay is added in winter. In Spain they feed not only on the fine herbage of the mountains, but on the succulent grass of the richest meadows, and occasionally on the leaves of vines and other trees, and all the variety of plants in the fallow or stubble fields. In other countries they are variously fed on clover, saintfoin, burnett, chicory, lucerne, reeds, the leaves of different trees, and the haulm of plants, all either fresh or dry, straw, the fruit and husk of the horse chesnut, bran, potatoes, carrots, beets, peas, beans, grains of all kind, and every sort of turnip and cabbage. Thus, says Dr. Parry, under this diversity of climate, soil and treatment, than which the mind can scarcely picture a greater, the Merino race of sheep has been found by experience to thrive and produce wool, which is in every respect, fully equal to the very best of the native growth of Spain. These facts prove that it is PECULIARITY OF BREED which we are to consider as chiefly productive of fine wool, in spite of the operation of other causes, and that the Merino breed is capable of bearing its transcendent fleece in this or any other country, in which it can subsist in sound and robust health.

I believe the first publication containing an opinion of the necessity of changing the climate to preserve the quality of wool

* In Spain the travelling flocks are called "*Transhumantes*," the stationary flocks "*Estantes*."

is the letter of **Don John Bowles** to **Peter Collinson**, inserted in the **British Annual Register**, for 1764, and which gave the first account of the travelling flocks of Spain. This letter I had read several years before my attention was turned to the subject ; and was even then struck with the apparent absurdity of the notion. I was pleased, therefore, to find it in the course of my reading some years after, completely refuted by so respectable an authority as **Bourgoanne**, who attributes the annual peregrinations to the true cause, viz. a search for food. **Col. Humphreys**, in a paper addressed to the **Massachusetts Agric. Soc.**, stated the strong fact of the existence of stationary flocks, and of their fleeces being of equal fineness with the transhumantes, or wandering sheep. Both those authorities were quoted by me in 1803,* and I added the additional authority of **Lasteyrie**, whose report of his sheep tour through the continent of **Europe**, had been slightly noticed in the foreign journals, and who particularly mentioned the fine quality of the fleeces of those **Merinos** that do not travel. Notice of the same fact had been since so frequently made, that I thought no one could entertain a doubt of it, and yet only a few weeks since, a tedious letter was inserted in a **Boston** paper, on **Merino** sheep, and unfortunately generally republished, purporting to be lately written by a gentleman long resident in Spain, which upon examination I found to be **Don Bowles'** letter to **Collinson**, containing a repetition of the errors which **Mr. Humphreys**, in the same town, had fully refuted six years before ! Zeal without judgment, or knowledge, is extensively mischievous. Had the editor been acquainted with the subject, he would have known that the whole of the history of the **Merino** travelling flocks, their management, discipline, and in short all the truths contained in **Bowles'** letter had been detailed last year, by **Mr. Livingston** in his book on sheep, who had very properly omitted all the notions which recent experience had proved to be erroneous.

ACCOUNT OF THE MERINOS IN THE UNITED STATES.

Until the present year, the only original imported stock rams and ewes, in the **United States**, were those of **Mr. Dupont**, **Mr. De-**

* *Domestic Encyclopædia.*

lessert, Col. Humphreys', and the Author's from Spain; Mr. Livingston's from France, and Mr. Müller's from Hesse Cassel. Of these, the two first mentioned arrived in 1801. Col. Humphreys' and Mr. Livingston's in 1802, the Author's in 1803; and Mr. Müller's in 1807. During the present year, several have been imported into the United States from Spain and Lisbon. The flock of Col. Humphreys' was the largest, he having imported upwards of one hundred sheep, from which and their descendants, many pieces of cloth have been made, and sold from seven to twelve dollars per yard. The particular history of Mr. Du Pont's fine ram is as follows :

Don Pedro was imported into the United States, in the year 1801, and is believed to be the first full-blooded Merino ram introduced into North America.

Mr. Dupont de Nemours, then in France, had persuaded Mr. Delessert, a banker of Paris, to send to this country some of those valuable sheep, and he having been at the head of a commission appointed by the French government to select in Spain, 4000 Merino sheep out of the number of 6000, which, by the treaty of Basle, the Spanish government had stipulated to present to France; it is natural to suppose that those which he selected for his own flock, were among the best. Four fine young ram lambs were accordingly shipped, two were intended for Mr. Delessert's farm, called Rosendale, situated near Kingston, on the Hudson river; one was intended for Mr. Dupont de Nemours, who was at that time settled in the vicinity of New-York, and the other was to be presented to Mr. Thomas Jefferson. Mr. Dupont embarked in the ship Benjamin Franklin, on board of which ship the four lambs were shipped, and was unfortunately detained upwards of twenty days in England; his subsequent passage to the United States was long and boisterous, in consequence of which three of the sheep died, and it was with the greatest difficulty that Mr. Dupont preserved the fourth. The ship arrived at Philadelphia on the 16th of July, 1801.

In 1801, Pedro tupped nine Ewes at Mr. Dupont's place near New-York; he was then sent to Mr. Delessert's farm, and served

a large flock during the years 1802, 3, and 4. In the course of 1805, Mr. Delessert having determined to rent his farm, and to sell all his stock, the progeny of Pedro were sold at public sale, at reduced prices, to the neighbouring farmers, who had no idea of the treasure which was offered to them ; being unacquainted with that breed of sheep, they neglected those valuable animals, great numbers of which have perished in their hands, or were sold to butchers ; the rest would probably have shared the same fate, had not chancellor Livingston become acquainted with the existence of those sheep, and purchased at advanced prices some of the ewes, which he put to his fine Merino rams of the Rambouillet stock. Pedro, like the rest of the flock of the Rosendale farm, was sold at vendue, and Mr. Dupont's agent bought him for 60 dollars.

In July 1805, Pedro was removed to E. I. Dupont's farm, situated in the state of Delaware, near the borough of Wilmington. That gentleman had a very small flock at that time, but was anxious to see that valuable breed propagated in the country, and with a view to attain that end, he offered the farmers of his neighbourhood the use of his ram, gratis ; they could not be prevailed upon to think much of what was offered to them free of cost ; the consequence was, that very few ewes were sent to Pedro during three seasons, and only by way of experiment.

In 1808, however, Mr. Dupont, with a view of increasing his own flock, purchased from the farmers, his neighbours, as many half or three-quarter blooded ewes of Pedro's breed as he was able to collect, which measure raised his character among the farmers. Since that time Pedro has served every year, from 60 to 80 ewes ; the vicinity of Wilmington will therefore be supplied with a large stock of fine woolled sheep, and as Mr. Dupont & Co. are erecting works for the purpose, cloth of any fineness may be made.

Pedro is now ten years old ; but very strong and active ; he is stout, short, and woolly, and of much better form than Merinos commonly are ; and even better than that of a ram figured in a superb engraving lately received by the Agricultural Society of

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Philadelphia from Paris. His horns are large and spiral ; his legs short, and he weighs 138 pounds ; his fleece carefully washed in cold water, weighs 8 1-2 pounds, is extremely fine, the staple 1 3-4 inches long, and lying very thick and close upon his body ; it is entirely free from loose coarse hairs, called jarr. Every part of his fleece, moreover, is nearly of equal fineness, even the wool of the hind legs and thighs, which is long and coarse upon many Merino sheep, is short and fine upon Pedro. This point, which in the case of wool so valuable as that of Merino sheep, is of great consequence, will be transmitted to his progeny, and proves the value of stock derived from him.

HISTORY OF THE AUTHORS' FLOCK.

I had been early impressed with a sense of the importance of the Merino breed of sheep to this country, from a knowledge of the great superiority, in softness and durability of the Spanish and French cloths over the English ; and because I knew that the British manufacturers annually imported many thousand bags of fine wool from Spain, Saxony and other parts of Germany, for the purpose of mixing with the wool of England for cloths. I therefore gave two orders for a Spanish ram so early as the years 1796 and 7, one of these was not attended to, but a friend who, on my first disappointment was particularly charged with the commission, succeeded in bringing one as far as the Capes of Delaware, when he was washed overboard in a storm. In 1801, another order was given, through a mercantile friend, to P. Yznardi, the son of the American Consul at Cadiz, for a ram and ewe. In the month of Dec. 1803, two rams and two ewes arrived in the ship *Eliza*, Capt. Blissel, after a boisterous passage of 60 days from Cadiz. The ewes yeaned on the voyage in a storm ; and notwithstanding the humane and obliging attention of the captain, who took the suffering animals into his cabin, both lambs died. My disappointment may be judged of when I found the whole stock were *black* : and the circumstance of sending two rams and two ewes, instead of one white pair, could only be accounted

for upon the principle of a wish to increase the profit of the commission ;* for black sheep cost but little, being held in no estimation in Spain ; and hence the clothes of the shepherds and poor peasantry are made of their wool. I was gratified, however, to find, that although black, the wool of my sheep was very fine, their fleeces very close and thick : their heads and bodies covered with wool, and their form round and compact ; their horns were large and spiral, exactly similar to those on the Merino ram, figured in Anderson on sheep. Having at the time no land occupied in the vicinity of Philadelphia, I placed my sheep at the farm of Joseph Cooper, New-Jersey. In the spring, I was distressed to find that my sheep were affected with scabby eruptions, and that the flock of my friend was also partially infected. As no such disease had ever before been seen among Mr. Cooper's sheep, he naturally ascribed its appearance to contagion from the strangers, and was apprehensive lest a serious evil should in consequence be entailed upon his stock. The only bad effect, however, resulting from it, was the loss of wool occasioned by the frequent rubbing of the animal against the fences and trees which was caused by the irritation of the scab, and after some application, I had the satisfaction to find that the sores healed without difficulty. It is probable that the hardships which my sheep suffered on the voyage, together with the want of necessary attention to cleanliness on ship board, occasioned their scabbiness.

Having taken away my sheep, I determined to cleanse their skins completely, and therefore had them well washed with soap and water early in the spring, and a fine tooth comb passed carefully through their wool from head to tail. This operation was easily performed, the animals having been previously shorn, while in Jersey : a large quantity of dirt was combed out, after which they were turned out to grass.

My anxiety to propagate the breed would not permit me to lose any time in announcing to the country my intention to let the rams to ewes, and accordingly in August, 1804, I circulated handbills very generally to that effect. The price fixed for every ewe brought to the ram was *one* dollar. Not one was brought, and

* The price of the sheep was sixty dollars, the freight twenty.

such was the indifference exhibited, that not one farmer for two years had the curiosity even to examine the wool. This indifference was probably to be attributed to the total ignorance of the farmers of the nature and qualities of the sheep, and to that shyness with which they view novelties of all kinds. I thought the black colour might be an objection, but their equal indifference to a white ram of Col. Humphreys' stock, which I afterwards procured, convinced me, that the time was not yet come for the conviction of the value of the breed. Trusting, however, that the public mind would be awakened to the importance of the object, and satisfied that I was at least doing good to the country, I determined to proceed, and to infuse the wool of my Spaniards into as many fine American ewes as I could procure. In the month of the previous July, I had bought a flock of sheep, from which, by the help of a friend who had been employed to sort wool during several years for the Yorkshire manufactures, I selected fourteen fine woolled ewes, which I put with the Spanish rams, and sold all the rest without delay. One of my Spanish ewes was either taken from the farm, or strayed away in the autumn after they were put on my farm; the other ewe yeanned her first American lamb in November, 1804, another about the same time the next year, and a third in the month of June, 1806. Her example of rapid procreation was followed the next year by several of my half blooded ewes, the progeny of my Spanish rams: an occurrence altogether novel on the part of our native sheep, and attributable probably to the constant high keep of my flock. I have taken care to prevent a continuance of this practice, from a conviction of its injurious tendency.

In consequence of the hardships my sheep underwent during the voyage, their scabbiness, and the dirty state of the wool, an accurate opinion could not be formed at their first shearing, with respect to either the quality of the wool, or to the quantity yielded; but the second clipping enabled me to judge fully on these heads, and I was pleased to find that the fleece covered the whole of the body so closely as actually to refuse admittance to the fingers down to the skin. The quantity of the wool yielded by the rams was $4\frac{1}{2}$ and $4\frac{3}{4}$ lbs., and $3\frac{1}{4}$ and $3\frac{1}{2}$ lbs. by the ewes. The re-

moval of the fleece enabled me likewise to judge accurately of the carcase of the rams, which was very different from the defective form commonly seen in the Merinos; being round bodied and well proportioned, and without dewlaps. I was much pleased to find that notwithstanding my rams were black, yet that the lambs which were the produce of a cross with white ewes, were in many instances white. In some cases of twins, one was black and the other was white: in others, the wool was dark grey, or rather pepper and salt, samples of which have been shown to the Agricultural Society. I had the satisfaction to find the improvement in the wool very evident, and had the ram been but white, I should have wished none superior. The effect of the cross was apparent not only in the universal coating of their bodies, but likewise in the form of their progeny: the American ewes were long legged and narrow backed, but the very first cross gave them some resemblance to the compact figure of their sires, and which increased in proportion to the increase of blood. Their shapes are very much like those of the South Down sheep, as given in Scott's plates of Sussex prize cattle.

As I did not know the habits of my Spaniards, I thought it most proper to house the flock every night, in the winter, together with their companions; for this purpose an apartment in an old log barn was chosen, and abundance of clean litter constantly supplied. In this place, while they were sheltered from the weather, the free circulation of the air through it, prevented those diseases to which sheep are particularly liable from close confinement; they remained secure from the attack of dogs, which in my neighbourhood are very destructive to sheep, and furnished me with a choice parcel of the most excellent manure.

Some of the circumstances of treatment have been incidentally mentioned in the foregoing pages; a few more particulars shall be added. My knowledge of the æconomy and general nature of sheep was extremely limited at the time when my experiments began. On one point I thought I could not err, and that was, in securing my flock a due supply of food, winter and summer. In the latter season, this was better than they required as stock sheep, and when the extraordinary fatness of my Spaniards was seen by

my farming neighbours, the probability of their death was predicted. I afterwards learnt that it is a common occurrence for American sheep, when very fat, to lie down in the field without any previous apparent indisposition and die. But week after week passed over without the least sickness in my flock : during the winter, they had as much as they could eat at night, and when the ewes began to drop in the winter and spring, they were fed with the various articles of hay, wheat bran and water, turnips, and potatoes. My hay was of the best quality, clover, timothy, and natural green grass. In the spring, I perceived that the wool of my American ewes began to start, particularly about their neck and breast, while no appearance of shedding was observable in the Spaniards, although subjected precisely to the same treatment as the others. This peculiarity did not fail to strike me as very great in the case of the Merinos, and I accordingly mentioned it as an argument in proof of their worth, in addition to that of their fine wool. I had never seen it mentioned in print, for I had not then read a book on the subject, except Anderson and Somerville, both of whom omit to notice it. Neither Lasteyrie's work, nor Parry's papers in the Bath Memoirs had reached this country at the time. The subsequent year I had the satisfaction to find that the same quality was infused into the half-bloods. But the following spring I perceived that in some of the descendants, there were appearances of shedding, which I thought might be fairly attributed to the heat arising from my flock, (now considerably increased), being confined in one place at night. In the half bloods I still occasionally observed the disposition to shed fleece in the spring, but the three-quarter and seven-eighth bloods retain it well.

The ewes proved to be excellent nurses ; in but two instances in six years, have ewes refused to own their lambs. One was in the case of a first lamb, the other was in a black ewe that did not exhibit an appearance of bag sufficient to denote her approaching yeaning, and was therefore not penned : she lambed in the night, and having lost her lamb in the flock before she had licked it clean, probably did not recognize it. After the attempt of two days without effect, to induce her to own it, it was determined to

raise it by hand, and success appeared to attend the trial, when it was killed by an accident. This occurrence of an unexpected lambing might be prevented by noting the time in a stud or tup-book, when a ewe takes the ram; a fact which may be easily ascertained, if the ewe be white, by reddening the brisket and belly of the ram, and by the daily examination of the ewes, as formerly advised. They are keen feeders, and very forward in taking food, so that the Dishly ewes, from their modest diffident habits, would stand no chance with them if I had ever allowed a contest for the trough or rack.

Being well convinced of the plausibility of Dr. Anderson's opinion, viz. that there was no necessary connexion between fineness of fleece and bad meat, and being anxious to put to the test the *positive* assertion of Col. Humphreys, in his address to the Boston Agricultural Society, respecting the good quality of Merino mutton, I determined to have some of the half blood lambs killed; and I accordingly disposed of several of my black lambs to Mr. Raybold, in 1806, and having seen them in the stall, I was much gratified in finding them die well. Mr. Raybold declared to me, that he had not killed such fine lambs that season; many other persons saw them, all of whom acknowledged their excellence. Thus then I had the satisfaction to see, that if an amelioration in the quality of the wool should not prove an object of importance, the improvements in the flesh by the Merino cross, would be worth attention by the farmer; for extensive observation had convinced me of the truth of a speech of that experienced shepherd, the late Mr. Capner, that "the breed of American sheep was worn out."

But on the subject of the quality of the flesh of the Merino cross, it may be necessary to dwell more particularly. One of the arguments used by the importers of Spanish wool into England, against the propriety of attempting to improve the wool of Britain by the Merino cross, was the traditionary tale of the badness of their flesh; and the danger, if they were generally introduced, of their supplanting those breeds from which the markets had been before supplied with their great national dish, a *mutton chop*. This home argument, however, failed to produce

its effects, for Dr. Parry, Lord Sommerville, and others, immediately deprived it of all weight, by shewing that the mutton, under a tolerable chance of pasture, was excellent. In the United States, the same tale being often told, and the question as to the quality of the Merino mutton is often asked, it is thought proper to shew that the flesh is no way inferior when crossed with foreign breeds. Previously however to entering on the subject, it may be asserted, that even if the fact were as stated, it ought not to prevent the propagation of the breed, because, thanks be to Providence, there is a superabundance of animal food in the United States, and particularly of mutton; and the superiority of fleece of even a half or quarter blood Merino sheep, over that of a common American or other sheep, would render them an object worthy of speculation.

The opinion of the inferiority of the Merino flesh has probably originated from the known fact, that Spain, and particularly Madrid, is supplied with mutton from Barbary. If this argument is permitted to have any weight, it ought also by parity of reasoning to be concluded, that the cows, oxen and hogs of the vicinity of Madrid, afford bad flesh, because their beef and pork come from France; and that all the hens lay bad eggs because their eggs are brought from the Pyrenees.* The state of the case is, that Merinos in Spain are considered merely as wool bearing animals, and kept of course for their wool; the culled sheep only, being consumed by the shepherds of the travelling *cavannas* or flocks, and as those sheep have none but the common pasture, and are in almost perpetual motion except at night, their chance of acquiring fat is very small: but the case is very different when a fair chance is given the breed, of good pasture and proper treatment in other countries, as the following facts will show.

In England, nine wethers of the King's flock were sent in 1801, to the marshes, with the express view of trying the effect of rich pasture in fattening sheep of this breed: they were sold to Mr. Giblet, a well known butcher in New Bond-street; to whom, and to his customers, reference is made by sir Joseph Banks. He

* Lasteyrie, Traite, sur les Bêtes-a-Laine, p. 119.

adds, "experience, however, has demonstrated already, both at Windsor and at Weybridge, that Spanish mutton is of the best quality for a gentleman's table."* In a late communication to the Board of Agriculture of England, sir Joseph says, "the butchers readily offered for the sheep, when fat, a fair mutton price. There are two instances in which, when the fat stock agreed for was exhausted, the butcher who had bought them, anxiously inquired for more, because he said the mutton was so very much approved of by his best customers." Lastly, Dr. Parry† says, that "although, he has never less than from thirty to a hundred sheep or lambs feeding together, and is obliged to crop the grass of one field nearly bare, before he sends a division into another field, yet even under this management many of them have become fat, and have either been sold to the butcher at a price which was the very top of the market, or been killed for the use of his own family. Those which he has so expended, have been certainly superior in flavour to any mutton which he had ever purchased. The fat approaches in taste and consistency to that of venison, more than any of the native English breeds. The wethers have reached from 12 to 15 1-2 lbs. the quarter, and from a two shear sheep of the latter weight, he had 12 1-2 lbs. loose fat." He adds, "a butcher or grazier would doubtless have done much more for them in this respect, than was consistent with my views. Experiments of this kind, made by two gentlemen, whose names cannot be mentioned without insuring respect, have had the most satisfactory results: I allude to lord Somerville, and Mr. Tollet, the former of whose Merino Ryeland sheep, exhibited at the Bath Agricultural Society, were in all points greatly admired by various gentlemen, who saw and tasted them. According to Mr. Tollet, a half blood Merino Ryeland wether, weighed 18½ lbs. the quarter, and had 18½ lbs. rough fat; and it is worthy of particular notice, that while his best South Down wether weighed 22½ lbs. the quarter, and had 18 lbs. rough fat, another of the same age, half Merino, half Ryeland, fed with the former from

* Report of the state of his Majesty's flock, by Sir Joseph Banks.

† Comm. Board Agric. vol. 3. p. 470.

a lamb, weighed 27 lbs. the quarter, and had 23 lbs. rough fat." Dr. Parry gives other statements to show the rapid increase of flesh and fat upon his Merino Ryeland cross selected without regard to form, but it is thought unnecessary to detail them. Those already given, are sufficient for all who view the subject dispassionately, but to others, who think that no animal can be good or profitable except it be large, the following fact, which a recent British publication enables me to state, will prove agreeable: Mr. Tollet produced at the Sussex Cattle Show, September, 1808, a three year old Merino wether, bred by himself, which weighed 33 lbs. per quarter, the fleece weighed 5 lbs.: and further, Mr. Wonner, a butcher of Philadelphia, informed me, that he killed a half blood lamb from the stock of Mr. Godly, of New-Jersey, four months old, which weighed 14 lbs. per quarter.

Besides the lot of lambs which I sold to Mr. Raybold, of the first cross, I have every year been in the practice of supplying my own table with lambs and wethers of different degrees of blood, from four and five months, to three years of age; and was always gratified in showing them as favourable specimens of speedy and sufficient fattening. In particular, I may refer to twenty-one wethers, half and three-quarter blood, which I sold last October, to Jacob Shepard, of stall No. 76, New-Market; a quarter of one of those (not particularly selected) was seen by George Clymer, Esq. Vice President of the Agricultural Society, and by a few of my neighbours, who, as well as the customers of Mr. Shepard, can speak as to the appearance and taste of the mutton. The fat was well diffused through the flesh without being deficient on the kidney.* The quarters weighed generally from 12 to 15 lbs., a size sufficiently large for a private table. Several butchers have killed half and quarter blood lambs in Philadelphia, from other stocks,

* The quantity of fat is much smaller upon the kidneys than what is seen in the large stall fed wethers which are shown every winter in our markets, and which attract the notice of the passenger. But I am not anxious to encourage such stock, being well convinced that no animal stall fed after grass, pays the farmer. Moreover, I conceive that after the flesh is properly marbled with fat, all superabundant fat is useless.

who if required would give testimony as to the excellence of the meat.

I have it in my power to state further on the subject, what other improvers will deem themselves happy in not being obliged to prove from their experience, viz. the flavour of the flesh of a full blood Merino.

Having had no demand for the progeny of my black rams, for breed, although carrying nearly as fine wool as I ever saw, I have been reluctantly induced to kill them. My last full blood ram lamb was killed in July 1809, for fear of his beginning to exercise his powers among my ewes. He was out of my own imported ewe, by Col. Humphreys' full blood white ram, now in the possession of William Pearson, Esq. of Bordenton, New-Jersey; and I can truly say, that better or more finely flavoured lamb I never eat. A friend, who like myself is fond of mutton and lamb, and who dined with me on part of this lamb, declared it reminded him of the small delicate mutton, whereof he had eaten in Wales.

I regret to have taken up so much time upon this question; but it has not been hitherto brought before the American public, and justice apparently required that the truth with respect to it should be known. I hope that good may therefore attend the discussion, by removing any obstacle to the extension of what I sincerely deem one of the most promising SOURCES OF GENERAL WEALTH THIS COUNTRY EVER POSSESSED.

In the year 1807, I was politely offered, by Mr. Bulkley, the use of a full blooded ram of Col. Humphreys; he was of a small size, but as to wool equal in quality to any, though in length of staple it was somewhat less than that of Mr. Livingston's rams. He was extremely gentle and strongly marked with the carnation hue of skin; had spiral horns and brownness of fleece surface,* all of

* This brownness penetrates to some depth from the surface, and arises from the retention of the particles of soil by the wool, which abounds with the yolk or natural grease exsuded from the skin, and diffused through the fleece. It might have been noted before, that by the analysis of this yolk by Messrs. Roard, and Vauquelin, it was found to be a true animal or natural soap, composed of potash, and a fatty matter. I very early remarked, that when handling Merino wool, the yolk adhered to the skin like oil, and when washed off, that it left the hands soft and smooth.

which qualities he faithfully transmitted to his progeny in their usual proportions. He sheared 4 lbs. full weight of wool washed on his back.

Upon the approach of the rutting season, all my rams except the one just mentioned, were put into the most remote field in the farm, and one given to leaping was hobbled; the tup ram was put with my ewes in the other extremity of the farm, and as I was much absent, my manager received a general strict charge to keep the flocks separate. I had no reason to doubt his veracity or attention, and therefore I remained at ease on the subject of deriving full benefit from the ram. The flocks were daily inspected, and regularly housed at night, nevertheless in the spring I was much mortified to find the greater part of my lambs covered with coarse hairs. As I had not noticed the occurrence in the case of the lambs from my own rams, and as the appearance was also novel to Mr. Du Pont, who was present on the 25th March, when the general examination took place, I could only conclude, that a long coarse woolled ram of a neighbour had visited my flock, and impregnated many of my ewes. My manager still persisted in the declaration of the care he had taken to prevent all intercourse with the ewes, except the selected tup ram, and although appearances were so much against him, I deferred forming my judgment until after the lapse of some time. I was relieved from much uneasiness in the course of a few months by seeing the hairy part fall off, leaving a fine coat, which gradually increased in thickness and quality. In the following season a neighbour brought two ewes to the same ram, whose progeny were also observed to be covered with hair, when first lambed.* It is extremely important to state, that this coarseness of Merino lamb's wool bears no proportion to the subsequent fine quality of the fleece of the mature sheep, and that some time elapses before an accurate judgment can be formed of the fineness to which it may arrive. Dr. Parry, whose authority is very great on every subject connected with

* I mention the above facts so minutely, for the satisfaction of those who are about to commence the breeding of Merino sheep; and to show the caution necessary in imputing neglect to those who have previously served us well, even where appearances would justify the suspicion.

Merino wool, and whose facts are the result of observations made with great precision and impartiality, says, that "our judgment as to the qualities of wool and carcase in this breed of sheep, cannot be accurately formed before they are two years and a half old, for which reason I do not like to employ or part with yearling rams, and much less my lambs. This same circumstance makes me much more averse to the castration of lambs, which I never perform except upon those, which have either sprung from coarse woolled ewes, or are grossly defective in point of carcase. The loss I thus sustain, bears no comparison with that of an excellent ram. Ignorant persons foolishly wonder, that for such a ram of the Merino race, Mr. Tollet refused two hundred guineas; but to a man solicitous for the establishment of a perfect flock, a ram pre-eminent in every point is absolutely inestimable, especially in a breed in which the choice is necessarily confined within such narrow limits. Actuated by similar views, I have at present rams, for which I would not take twice the sum offered to Mr. Tollet."

Ideas of fineness and softness are so generally connected with that of lamb's wool, that the want of those qualities in a ram may occasion an improper or unfortunate resolve with respect to one, whose subsequent superiority might prove highly beneficial to us: for this reason I thought proper to take particular notice of the circumstance, of the coarse appearance in some of my young lambs.

The following are the weights of some of my flock the present season.

Rams.	lbs.
Jumper, 4 years old, - - - -	134 $\frac{3}{4}$ shorn.
September, - - - - -	104 $\frac{3}{4}$
Don Pedro Jr., by Don Pedro, two tooth,	94 $\frac{3}{4}$ shorn.
Ram lamb, 3 months old, - - -	47
" " 15 " " - - -	85 shorn.
Ram, two tooth, - - - - -	74 "
" " " - - - - -	78 "
" 6 months old, - - - - -	74 $\frac{3}{4}$

No sheep can be more hardy than the Merinos. This hardihood may be a peculiar attribute of the race, or may proceed from

the nature of their fleece, which being so close and thick set, prevents the penetration of moisture, which is well known to be injurious to the constitution of sheep. In either case the consequence is highly important. Repeated proofs have been afforded to me of this fact, on the occurrence of a sudden storm of snow and sleet. Thus in November last, when from the mildness of the evening, the flock was permitted to be out, a snow storm unusually severe and cold came on, and in the morning when the sheep were brought home, and driven under shelter, I perceived that the Spaniards appeared insensible to the thick coat of snow and sleet crystalised upon their backs, while the open woolled New Leicester and American ewes, were evidently affected thereby, the moisture having generally penetrated to their skins.

In the autumn of 1803, I added sixteen half blood Dishley, or New Leicester ewes, to my flock, and crossed them with my new acquisition; the form of the progeny has certainly been thus improved. A shorter woolled breed would have been preferable, but all distinction of sheep in these parts of the country have been lost, and the forms of the drove sheep being so very inferior, I determined to take my chance as to the result of the cross on the working quality of the wool, and made sure of improving the form. The influence of the mother in determining the form, was indeed evident, not only in the improvement of those of my own flock, but as to the size, was strikingly illustrated in that of a neighbour's, who put two fine large ewes of the Irish breed to my ram; a ram lamb, the produce of one of those ewes, exhibited at the Cattle Show, last October, proved to be larger than my lamb, although Don Pedro, his sire, is larger than my stock tup:—the fact was, my ewe was smaller than the Irish descendant. No comparison of weights was made.

In imitation of the experiments made at the national sheep farm in France, of permitting the wool of some Merinos to grow for the period of three years, I permitted a yearling seven-eighths ram sheared in September 1808, to retain his fleece until the following July, as stated in the account of the Cattle Show, p. 53; there was not the smallest appearance of a disposition to shed his fleece, nor did he suffer in the least in his health or growth for

want of the usual proportion of covering after his fleece was taken off, three weeks subsequent to his exhibition at the Cattle Show. He was my tup ram of last year.

DISEASES OF SHEEP.

Agricultural works of Europe, and particularly of England, give an alarming account of the numerous diseases to which sheep are subject, but I have already mentioned that in this country they are very few and easily cured. The late Mr. Capner, of Flemington, New-Jersey, who had kept sheep in Leicestershire, has recorded the fact of the superior healthiness of sheep in this country when compared to England.* Some of my old ewes have died towards spring, apparently more from natural exhaustion than actual disease. One three tooth half blood Merino ewe died suddenly in April last. She was in a field, and was observed to lay down and gradually expire. My full blood ram lamb had the staggers when about fifteen months old, attended with a weakness in his hind legs. I bled him in the neck, and he got well. In the spring of the year they almost universally purge, a symptom aided greatly by the succulent wild garlic with which nearly all the arable fields on my farm, and in the vicinity abound more or less; but so far from any injurious effects being produced by it, that I think the plant alike salutary to them and to cattle. The swelling of the udders of ewes has been already mentioned.

I have often noticed the adhesion of the tail to the vent, owing to the glutinous nature of the excrements, but have had no difficulty in preventing loss, by simply washing the parts. In one case there was no vent hole, and had I been aware of the probability of such an occurrence, I would have tried the effect of perforating the part. In such case the aperture should be prevented from closing by gently inserting a twisted piece of greased linen.

For the scouring of lambs, Dr. Parry recommends a mixture of salt and refined chalk, dried over a fire, and to allow but little water. This remedy, with boiled milk, and occasionally corn meal

* Memoirs Agric. Sec. Philad. vol. 1.

in fine powder browned in a pan over the fire, cannot fail of being useful. Corn and boiled potatoes, as being nourishing and very strengthening, should be given in moderation to the ewes. A warm and dry shelter is indispensable.

A few sheep have had a soreness in the claws of their hoofs, which was easily removed by scraping the parts, and applying spirits of turpentine, or tar. A few have had some scabby eruptions on their bodies, in the spring before shearing, but I have never had occasion to apply any remedy. Unless when taken by infection, the true scab generally proceeds from poverty and want of attention to cleanliness. The remedies in the latter cases are obvious. In common cases the application of a little mercurial ointment, tobacco water or spirits of turpentine to the scab, will effect a cure. The rising of the wool will point out the part affected.

The staggers, or dizziness, which attacked three of Mr. Livingston's yearlings were cured in the course of six weeks, by good nursing, and supplying food whenever the animals would eat. "This disease is found upon dissection to be owing to a bag of water within the skull pressing on the brain. It is generally considered as incurable, though it is said by others, that it may be remedied by trepanning: a soft place on the head indicates the situation of the bag, which if taken out will remove the disorder."* This operation it is clear can only be performed by a medical man, and common sheep would not pay the expense. Lasteurie says, that in Prussia, they secure their flocks from this disease, by fastening a linen cloth covered with pitch on the heads of the lambs, previously to conducting them into the fields. This cap, they maintain, prevents the intromission of the worm which the flies deposit in the frontal sinus, during the earliest youth of the animals.† A fact so important as this deserves to be attended to, and it is to be hoped, that in case the disease should become common, the experiment will be made.

Hoven.—In all brute animals, this disease proceeds from the same cause, viz. the sudden extrication of air from clover, or other juicy food too greedily devoured, causing a considerable swelling and painful distension of the body. The symptoms in

* Livingston on sheep, p. 107, Comm. Board Agric. Lond. vol. 1.

† Traite, &c. p. 192.

oxen and cows are so accurately detailed by Mr. Peters,* that it is unnecessary to dwell upon it here : it will be sufficient to state, that the remedy, the only certain and speedy remedy for the disease is to plunge the first knife that may be at hand, into the paunch, and to keep the wound open until the swelling subsides, by a tube of elder or of bone. Castor oil and molasses, or Glauber salts dissolved in water, or aloes powdered and made up into pills with soap, may be given to open the bowels.

The Rot.—In England it is universally allowed to proceed from moist exhalations in low swampy places, even confinement for a single night in such places has produced the disease : and yet it is acknowledged that it prevails on the dry limed land in Derbyshire. On the contrary, a swampy place near Wilmington, Del. was pointed out to me, in which a farmer kept a flock of sheep constantly without loss. Nevertheless, when it has appeared, the principle remedies that have been applied, are, removal to dry well-sheltered spots or yards, and a regular allowance of sweet dry food (giving but little water) with salt, or salt pasture. Also, "Tar rubbed on their troughs, free use of pitch pine buds and branches, sulphur in the early stages, camphor rubbed on their gums, or given in the form of pills."†

It has been remarked, that sheep are much disposed to feed, during the three or four first weeks after being tainted. When the first stage is over, flukes begin to appear in the gall-bladder, and ducts, and before death are very numerous. In a few weeks after being seized, the sheep shrink, and become flaccid in the loins. By pressure about the hips, a crackling is sometimes perceptible, the countenance then looks pale, and upon parting the fleece, the skin is seen of a pale red, and the wool easily separates from the pelt. As the disorder advances the skin becomes dappled with yellow or black spots. Debility and emaciation succeed, and increase until the sheep dies.

The catarrhal affection, or running at the nose, has been supposed to be either a companion or consequence of the rot in

* Memoirs of the Agric. Soc. Philad. vol. 1.

† On sheep in the United States, Comm. Board. Agric. vol. 1.

sheep. I have observed this complaint most commonly to affect old sheep, but have never lost one by it. I usually have rubbed tar on the nose, under the supposition that it proceeded from the irritation of worms breeding up the nose, as mentioned by Mr. Capner. Those whose sheep die after having this complaint, should make it a point to open the head and bodies of the animals, in order to determine the question, and I will thankfully receive any facts on the subject. One general rule in this and all other complaints of sheep ought to be, to separate the sick from the well, for most of their complaints are contagious.

Ticks.—These disgusting insects are well known to be very troublesome and highly injurious to sheep. The common remedy in England is to soak the wool in arsenic water, but so dangerous a remedy ought never to be used, especially when tobacco water will answer the end effectually. Mr. Livingston recommends the following method, which is well worth being tried. "Take a bellows, to the nozzle of which a pipe must be affixed, capable of containing a handful of tobacco: set fire to the tobacco, and while one man holds the sheep between his knees, let another open the wool, while a third blows the smoke into the fleece: close the wool on the smoke, and open another place a few inches from it, and so go over the whole sheep, blowing also under the belly and between the legs: in twenty-four hours every tick will be killed. The whole operation may be performed upon a sheep in about two minutes."

Mr. Capner* mentions three kinds of intestinal worms, only one of which proved injurious: also worms in the frontal sinus proceeding from the eggs of a bee laid a little way up the nose, which creep up as they grow. Their existence is known by the sheep snuffling and throwing up its head. Tarring the nose is a palliative.

Of the terrible *fly*, the dread of the European shepherd, and the scourge of his flocks, we happily remain ignorant. It deposits its eggs on the wool near any wound or scratch, or even in one made by its own bite, and which, soon becoming maggots, eat and destroy all around them, and in a very short time kill

* Memoirs, Agric. Soc. Philad. vol. 1.

the animal. All wounds therefore from shears, briars or other causes should be rubbed with tar, or sturgeon's oil, or oil of turpentine, all of which are offensive to flies and insects generally.

What then it may be fairly asked, are the conclusions to be drawn from the facts already ascertained with respect to sheep, or the proper answer to the question of the success of the American shepherd? We have seen in the first place, that even with very deficient attention, there is a general prevalence of health in the American flocks, which of course could proceed only from the combined causes of climate and soil; and that by attention to selection, improvement in form, and in quality and quantity of fleece has been made, of which, any European improver might well boast. It has been further seen, that in the case of the invaluable Merino, the quality of the fleece of the imported stock has not diminished, and that the descendants of full-bred sheep yeaned in this country, have yielded at a first shearing, more wool than the male parent: that the live weights of the animals are fully equal, and in many instances superior to those of sheep of equal ages in Europe; and lastly, that their hardihood and health are greater than the common breeds of this country, and their flesh excellent.

There can be no doubt therefore, that the perfect freedom and unrestrained manner with which all our agricultural operations are conducted, and the great encouragement given to the growth of fine wool by the demand for fine cloths; that the extension of the Merino breed promises a greater and quicker return for capital employed, than any other object which can engage the farmer's attention. As to the fear of their too great increase, let any one reflect upon the immense sums of money annually sent to England for broadcloths, and then answer the question, whether there is reasonable ground to expect the business to be over-done at least for a long time. It is only for want of wool, that our stores are not now all furnished with fine cloths. In every part of the country where there is a supply of the raw material, machines for carding and spinning it have been erected.* The time

* See Mr. Livingston's letter to the Editor. p. 17.

will shortly come, when the prediction which I made in 1803, as to the probability of wool becoming an article of export from the United States, will be verified. On ourselves does the fulfilment of it depend: nature, climate, and soil, will do much for us.

I regret that I was unable to insert in the proper place, the following additional accounts of improvements in carcase and fleece of sheep in Virginia: they are now given as honorable testimonials of successful zeal and enterprize, and to give encouragement to those disposed to undertake the task of improving. The sheep were exhibited at Mr. Custis's show, in April 1808.

Mr. Lawrence Lewis, of Wood Lawn, Virginia, exhibited a lamb called Dishly, of the race of Arlington long woolled breed of Mr. Custis. He weighed on the hoof, 140 lbs.—fleece, $6\frac{1}{4}$ lbs.

Mr. Hazard Foster's lamb "Badger,"* same breed and age, weighed unshorn, 105 lbs., the staple of the fleece measured 12 inches.

"Superb,"* a yearling, was bred by Col. J. Tayloe, from a ewe of Mr. Dorsey's stock, by a ram of Mr. Tayloe's own breed—his fleece weighed $8\frac{1}{4}$ lbs.

Mr. William Alexander, of Preston, Virginia, showed a lamb called "Preston," weight unshorn, 146 lbs., fleece $7\frac{3}{4}$ lbs.

The judges of the day were

THOMAS DIGGS,
J. MASON,
WM. LEE,
JONA. SWIFT.

* See p. 71.

ERRATA.—Page 88, line 13, for *as far back as the tail*, read *the back as far as the tail*. In some copies, for *affects*, read *effects*. Page 109, line 2, in some copies, for *carcase of the rams, which was*, read *carcases of the rams, which were*.